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Report Numbers: 208S-TRC-98-006

# Vehicle Safety Compliance Sled Testing for Occupant Crash Protection

Ford Motor Company

1998 Ford Windstar

NHTSA Number: CW0209

TRC Test Number: 980220S

Transportation Research Center Inc.

10820 State Route 347

East Liberty, OH 43319

March 13, 1998

Final Report

Prepared For:

U. S. Department of Transportation

National Highway Traffic Safety Administration

Safety Assurance

Office of Vehicle Safety Compliance (NSA-30)

400 Seventh Street, S.W., Room No. 6115

Washington, DC 20590

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16. Abstract

An FMVSS 208 compliance sled test was conducted on a 1998 Ford Windstar, NHTSA No. CW0209, at Transportation Research Center Inc. on February 20, 1998. This test was conducted to determine compliance with Federal Motor Vehicle Safety Standards (FMVSS): 208, "Occupant Crash Protection". The Hybrid III dummies installed for this test were not restrained by seat belts. The ambient temperature was 70° F. The sled carriage was accelerated to 17.5 g with an integrated velocity change of 29.2 mph.

The driver's Head Injury Criteria (HIC) was 233. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41.9 g. The driver's chest deflection was 1.4 inches. The driver's left and right femur maximum axial forces were 1316 pounds and 1673 pounds, respectively. The driver's maximum neck flexion about the occipital condyle was 33.1 Newton-meters. The driver's maximum neck extension about the occipital condyle was 16.4 Newton-meters. The driver's maximum axial neck tension was 1097 Newtons. The driver's maximum axial neck compression was 2561 Newtons. The driver's maximum fore and aft neck shear was 787 Newtons.

The passenger's HIC was 366. The passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41.1 g. The passenger's chest deflection was 0.4 inch. The passenger's left and right femur maximum axial forces were 706 pounds and 1097 pounds, respectively. The passenger's maximum neck flexion about the occipital condyle was 56.6 Newton-meters. The passenger's maximum neck extension about the occipital condyle was 25.8 Newton-meters. The passenger's maximum axial neck tension was 943 Newtons. The passenger's maximum axial neck compression was 3929 Newtons. The passenger's maximum fore and aft neck shear was 1199 Newtons.

| | | | |
|---|---|---|---|
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# Section 1.0

## Purpose and Test Procedure

## Purpose

This FMVSS 208 compliance sled test is part of the Federal Motor Vehicle Safety Standards (FMVSS) 208 compliance test program conducted for the National Highway Traffic Safety Administration (NHTSA) by the Transportation Research Center Inc. (TRC) under Contract No. DTNH22-93-D-01089. The purpose of this test was to determine if the subject vehicle, a 1998 Ford Windstar, NHTSA No. CW0209, meets the performance requirements of FMVSS 208, "Occupant Crash Protection," in the impact simulation sled test mode. This test was conducted to determine if the front outboard dummies and restraint systems meets aforementioned performance requirements.

## Test Procedure

This test was conducted in accordance with NHTSA's Office of Vehicle Safety Compliance (OVSC) Laboratory Test Procedure No. TP-208S-00, dated June 17, 1997. Data was obtained relative to FMVSS 208, "Occupant Crash Protection," performance.

The test vehicle was instrumented with six (6) accelerometers to measure longitudinal axis accelerations.

The test vehicle contained two (2) Part 572 E 50th percentile adult male anthropomorphic test devices (dummies). The dummies were positioned in the front outboard designated seating positions according to the dummy placement procedure specified in Appendix B of the Laboratory Test Procedure. The dummies were not restrained by seat belts.

Both dummies were instrumented with head and chest accelerometers to measure longitudinal, lateral, and vertical accelerations; chest deflection potentiometers; left and right femur load cells to measure axial forces; and upper neck load cells to measure longitudinal, lateral, and vertical forces and moments.

The forty (40) data channels were digitally sampled at 12,500 samples per second and processed per Sections 11.7 through 11.9 of the Laboratory Test Procedure.

The sled test event was recorded by one (1) real-time motion picture camera and six (6) high-speed motion picture cameras. The pre-test and post-test conditions were recorded by one (1) real-time motion picture camera.

The vehicle and occupant data are summarized in Section 2.0. The FMVSS 208 data are presented in Section 3.0. The vehicle, occupant, and camera measurements are presented in Section 4.0. Appendix A contains the still photographic prints. Appendix B contains the dummy and vehicle data plots. Appendix C contains the manufacturer's vehicle information.

## Section 2.0

FMVSS 208 Compliance Sled Test Summary

## Test Results Summary

This FMVSS 208 compliance sled test was conducted at TRC on February 20, 1998

The test vehicle, a 1998 Ford Windstar, NHTSA No. CW0209, appeared to comply with the performance requirements of FMVSS 208 in the impact simulation sled test mode. The Head Injury Criteria (HIC) calculations were less than 1000, the chest resultant accelerations did not exceed 60 g's, the chest deflections did not exceed 3.0 inches, and the compressive forces transmitted through the upper legs did not exceed 2,250 pounds as measured by the Part 572 E dummies. The neck flexion moments about the occipital condyles did not exceed 190 N·m, the neck extension moments about the occipital condyles did not exceed 57 N·m, the neck tensions did not exceed 3300 N, the neck compressions did not exceed 4000 N, and the neck fore and aft shear forces did not exceed 3100 N as measured by the Part 572 E dummies.

The test vehicle was equipped with airbags at the driver and passenger seating positions. The Hybrid III dummies were not restrained by seat belts. The sled carriage was accelerated to 17.5 g with an integrated velocity change of 29.2 mph. The airbags were triggered at 20.2 milliseconds after 0.5 g acceleration was measured by the firing circuit. Following subsequent digital data processing and filtering the acceleration signal to Channel Class 60, the airbag event trigger signal was 19.1 ms after the 0.5 g acceleration level was indicated.

The driver's HIC was 233. The driver's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41.9 g. The driver's chest deflection was 1.4 inches. The driver's left and right femur maximum compressive forces were 1316 pounds and 1673 pounds, respectively. The driver's maximum neck moments were 16.4 N·m extension and 33.1 N·m flexion. The driver's maximum neck forces were 1097 N tension, 2561 N compression and 787 N fore and aft shear.

The right front passenger's HIC was 366. The right front passenger's chest maximum resultant acceleration with three (3) milliseconds minimum duration was 41.1 g. The right front passenger's chest deflection was 0.4 inch. The right front passenger's left and right femur maximum compressive forces were 706 pounds and 1097 pounds, respectively. The right front passenger's maximum neck moments about the occipital condyle were 25.8 N·m extension and 56.6 N·m flexion. The right front passenger's maximum neck forces were 943 N axial tension, 3929 N axial compression and 1199 N fore and aft shear.

The vehicle's seat belt warning system met all of the applicable seat belt warning system requirements. Option (S7.3(a)(1)) was chosen by the manufacturer.

The vehicle's labeling and driver's manual information met all applicable requirements.

The vehicle's air bag readiness indicator met all applicable requirements.

The vehicle's rear outboard seating positions seat belt type met all applicable requirements.

The vehicle's seat belts met the applicable lap belt lockability requirements.

The vehicle's permanently attached air bag labels met the applicable requirements.

The vehicle was received without a label on the dash or steering wheel hub. (S4.5.1(e)). Consequently, it could not be checked against applicable requirements.

The seat belt comfort and convenience check for front outboard designated seating positions indicated the vehicle met all applicable requirements.

Table 1 Sled Test Summary

| | |
|---|---|
| NHTSA number: | CW0209 |
| Test type: | FMVSS 208 Compliance Sled Test |
| Test date: | 02/20/98 |
| Test time: | 3:55 p.m. |
| Ambient temperature at impact area: | 70° F |
| Vehicle year/make/ model/body style: | 1998/Ford/Windstar |
| Vehicle test weight: | 4360 lb |

Sled carriage:

| | |
|---|---|
| Integrated velocity from the integration of the entire sled acceleration: | 29.2 mph |
| Measured velocity from the light trap device attached to the sled: | 29.7 mph |
| Acceleration: | 17.5 g |
| Time from T-0(-0.5 g) to 0.0 g: | 123.2 msec |
| Acceleration corridor achieved: | Yes |

Number of cameras:

| | |
|---|---|
| Real-time: | 1 |
| High-speed: | 6 |

| Dummies: | Driver #230 | Passenger #314 |
|---|---|---|
| Type: | Part 572 E | Part 572 E |
| Location: | Left front | Right front |
| Restraint: | Airbag | Airbag |
| Number of data channels: | 15 | 15 |

Front seat data:

| | | |
|---|---|---|
| Seat track failure: | No apparent failure | No apparent failure |
| Seat back failure: | No apparent failure | No apparent failure |

Visible dummy contact points:

| | | |
|---|---|---|
| Head: | Airbag, sun visor, windshield, ceiling | Airbag, windshield, |
| Chest: | Airbag | Airbag |
| Abdomen: | Airbag | Airbag |
| Left knee: | Knee bolster | Glove box |
| Right knee: | Knee bolster | Glove box |

Table 2 Dummy Kinematics Summary

Left Front Driver Dummy

Upon impact, the driver dummy translated forward on the seat impacting both knees into the instrument panel's knee bolster. The dummy's head and chest were restrained by the airbag. The dummy's head contacted the windshield, the sun visor, and the roof. The dummy rebounded into the seatback. The dummy came to rest leaning forward in the driver's seat.

Right Front Passenger Dummy

Upon impact, the right front passenger dummy translated forward on the seat impacting both knees into the instrument panel's glove box. The dummy's head and chest were restrained by the airbag. The dummy's head contacted the windshield and broke the glass. The dummy's head rebounded off the glass into the top of the dashboard. The dummy rebounded into the seatback. The dummy came to rest leaning slightly forward in the passenger's seat.

Table 3 Test Vehicle Information

| | | | | |
|---|---|---|---|---|
| Vehicle year/make/ model/body style: | 1998/Ford/Windstar | | | |
| Color: | Toreador Red Metallic | | | |
| VIN: | 2FMZA51U4WBC20134 | | | |
| NHTSA number: | CW0209 | | | |
| Engine data: | | | | |
| Placement: | Lateral | | | |
| Cylinders: | 6 | | | |
| Displacement: | 3.0 liters | | | |
| Transmission data: | _4_ speed, | ___ manual, | __X__ automatic, | __X__ overdrive |
| Final drive: | _X_ fwd, | ___ rwd, | ___ 4wd | |
| Date vehicle received: | 01/29/98 | | | |
| Odometer reading: | 110 | | | |
| Dealer's name and address: | Bill Rose & Sons Inc.<br>11 S. Franklin St.<br>Richwood, OH 43344 | | | |

Accessories:

| | | | |
|---|---|---|---|
| Power steering | Yes | Automatic transmission | Yes |
| Power brakes | Yes | Automatic speed control | No |
| Power seats | No | Tilting steering wheel | Yes |
| Power windows | Yes | Telescoping steering wheel | No |
| Tinted glass | Yes | Air conditioning | Yes |
| Radio | Yes | Anti-lock brake | Yes |
| Clock | Yes | Rear window defroster | Yes |
| Power door locks | Yes | Other: Power mirrors | |

Certification data from vehicle's label:

| | | |
|---|---|---|
| Vehicle manufactured by: | | Ford Motor of Canada Ltd. |
| Date of manufacture: | | 10/97 |
| VIN: | | 2FMZA51U4WBC20134 |
| GVWR: | | 5060 lb |
| GAWR: | Front: | 2669 lb |
| | Rear: | 2434 lb |

Table 3 Test Vehicle Information, Cont'd.

| | |
|---|---|
| Size of tires on vehicle: | P205/70R15SL |
| Spare tire: | Space Saver T125 90R1596M |
| Type of front seats: | Bucket |

Tire & capacity data from vehicle's label:

| | |
|---|---|
| Recommended tire size: | P205/70R15SL |
| Recommended cold tire pressure: | |
| Front: | 35 psi |
| Rear: | 35 psi |

Designated Seating Capacity:

| | |
|---|---|
| Front | 2 |
| Rear | 5 |
| Total | 7 |
| Vehicle Capacity Weight: | 1350 lbs. |

Weight of test vehicle as received (with maximum fluids):

| | | | | | |
|---|---|---|---|---|---|
| Right front | 1150 | lb | Right rear | 720 | lb |
| Left front | 1160 | lb | Left rear | 680 | lb |
| Total front weight | 2310 | lb | (62.3% of total vehicle weight) | | |
| Total rear weight | 1400 | lb | (37.7% of total vehicle weight) | | |
| Total delivered weight | 3710 | lb | | | |

Table 3 Test Vehicle Information, Cont'd.

Calculation of test vehicle's target loaded test weight:

RCLW[1] = Rated Cargo and Luggage Weight

GVWR = Gross Vehicle Weight Rating (5060 lb)

UDW = Unloaded Delivered Weight (3710 lb)

VCW = Vehicle Capacity Weight = 5060 - 3710 = 1350 lb

DSC[2] = Designated Seating Capacity (7)

RCLW[1] = GVWR - UDW - 150 (7) = 5060 - 3710 - (1050) = 300 lb

Target loaded test weight: = UDW + RCLW[1] +(No. of Hybrid III dummies x 167 lb per dummy)

Target loaded test weight: = 3710 + 300 + 334 = 4344 lb

Weight of test vehicle with required dummies and 316 lb of cargo weight:

| | | | | | |
|---|---|---|---|---|---|
| Right front | 1220 | lb | Right rear | 980 | lb |
| Left front | 1240 | lb | Left rear | 920 | lb |
| Total front weight | 2460 | lb | (56.4% of total vehicle weight) | | |
| Total rear weight | 1900 | lb | (43.6% of total vehicle weight) | | |
| Total test weight | 4360 | lb | (16 lb. over target loaded test weight) | | |

Weight of ballast secured in vehicle: None

Components removed to meet target test weight: None

[1] Cargo weight for multi-purpose passenger vehicles, trucks, and buses is the vehicle's calculated cargo and luggage weight or 300 pounds, whichever is less.

[2] The designated seating capacity is determined by counting the number of seat belts installed in the vehicle.

Table 3 Test Vehicle Information, Cont'd.

Test Vehicle Attitude:

| | |
|---|---|
| As delivered door sill angle: | 1.4° |
| As tested door sill angle: | 1.1° |
| Fully loaded door sill angle: | 0.9° |
| Vehicle Wheelbase: | 121 inches |

Seat Data:

| | |
|---|---|
| Front seats: | Bucket seats |
| Seat track settings: | Mid. Manual seat adjustment. |
| Seat back settings: | A new procedure for setting the seat back was provided by Ford on test day. A descrition of the procedure, which involves alignment of two holes on the external and internal latch plates is provided in Appendix C, pages C-11 and C-12. A photograph is included in Appendix A, page A-34. |
| Driver: | 22.3°. Measured on the seat frame approximately 8 inches above the pivot. |
| Passenger: | 22.7°. Measured same as driver. |

Fuel System Data:

Fuel system capacity from owner's manual: 20.0 gallons

Useable capacity figure furnished by COTR: 20.0 gallons

Steering Column Adjustments

5 positions available. Set in 3rd (mid) position.

Table 4 Post-Impact Data

| | |
|---|---|
| Test number: | 980220S |
| NHTSA number: | CW0209 |
| Test date: | 02/20/98 |
| Test time: | 3:55 p.m. |
| Test type: | FMVSS 208 Compliance Sled Test |
| Impact angle: | 0° |
| Ambient temperature at impact area: | 70° F |
| Temperature in occupant compartment: | 70° F |

Sled carriage velocity:

| | |
|---|---|
| Integrated velocity from the integration of the entire sled acceleration: | 29.2 mph |
| Measured velocity from the light trap device attached to the sled (backup): | 29.7 mph |

Sled carriage acceleration:

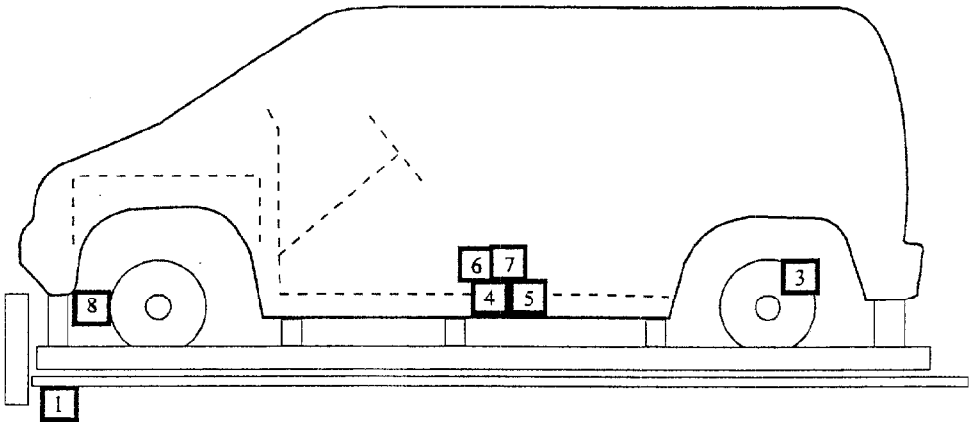
| | |
|---|---|
| Acceleration: | 17.5 g |

Sled carriage acceleration duration:

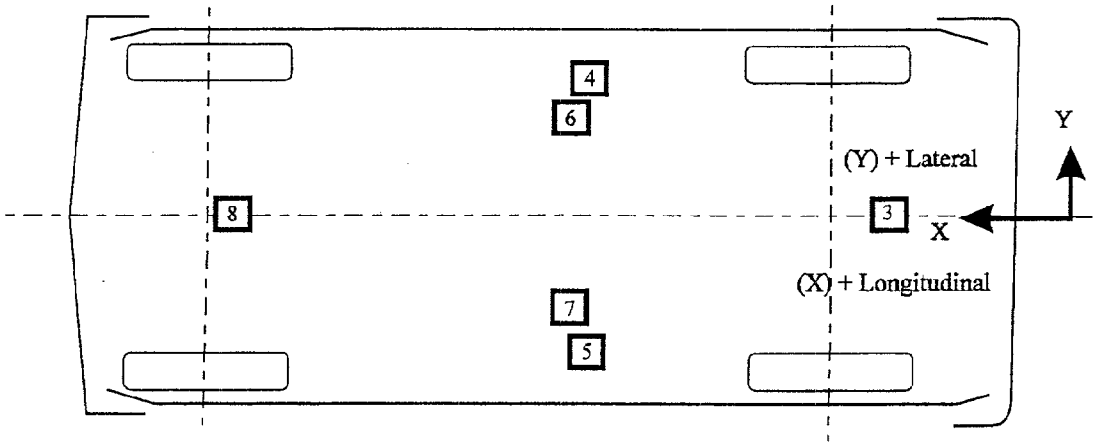
| | |
|---|---|
| Time from T-0(-0.5 g) to 0.0 g: | 123.2 msec |

The sled acceleration curve was within the specified corridor.

Figure 1 Vehicle Accelerometer Placement




**Side View**




**Bottom View**

Table 5 Vehicle Accelerometer Locations and Data Summary

| TEST NUMBER: 980220S<br>No. LOCATION | X | Y | POSITIVE DIRECTION | | NEGATIVE DIRECTION | |
|---|---|---|---|---|---|---|
| 1 SLED ACCELERATION | 174.1 in | -1.0 in | | | | |
| PRIMARY | | | 0.9 g | @ 126.6 ms | 17.5 g | @ 58.2 ms |
| REDUNDANT | | | 1.1 g | @ 128.9 ms | 17.6 g | @ 62.9 ms |
| 2 SLED VELOCITY | | | | | | |
| MEASURED | | | 0.1 mph | @ 3.1 ms | 29.7 mph | @ 155.8 ms |
| INTEGRATED | | | -0.1 mph | @ 3.1 ms | 29.2 mph | @ 123.3 ms |
| 3 REAR AXLE | 38.4 in | 1.0 in | | | | |
| LONGITUDINAL | | | 1.4 g | @ 127.5 ms | 18.5 g | @ 54.2 ms |
| 4 LEFT BODY | 105.6 in | -25.3 in | | | | |
| LONGITUDINAL | | | 2.1 g | @ 128.4 ms | 18.5 g | @ 57.1 ms |
| 5 RIGHT BODY | 105.9 in | 25.3 in | | | | |
| LONGITUDINAL | | | 2.1 g | @ 129.0 ms | 18.5 g | @ 56.6 ms |
| 6 LEFT FRAME | 106.5 in | -20.4 in | | | | |
| LONGITUDINAL | | | 3.7 g | @ 161.3 ms | 18.4 g | @ 57.6 ms |
| 7 RIGHT FRAME | 106.1 in | 20.4 in | | | | |
| LONGITUDINAL | | | 2.0 g | @ 129.0 ms | 18.7 g | @ 56.6 ms |
| 8 BOTTOM ENGINE | 169.3 in | -0.6 in | | | | |
| LONGITUDINAL | | | 3.2 g | @ 131.8 ms | 19.0 g | @ 62.2 ms |
| 9 AIRBAG | | | | | | |
| EVENT | | | 7.0 volt | @ 19.1 ms | --- | --- |

REFERENCE: X: + FORWARD FROM VEHICLE REAR SURFACE
Y: + RIGHTWARD FROM SLED CARRIAGE CENTERLINE

Section 3.0

FMVSS 208 Sled Test Data

## Table 6 Dummy Injury Criteria
### Maximum Acceleration

| | Head | | | | Chest | | |
|---|---|---|---|---|---|---|---|
| | X | Y | Z | R | X | Y | Z |
| Driver | -37.1 g | 9.3 g | 22.4 g | 42.9 g | -41.8 g | 2.8 g | 16.3 g |
| Passenger | -78.8 g | -65.4 g | -88.2 g | 111.1 g | -29.0 g | 4.9 g | 33.8 g |

### Maximum Femur Compressive Force

| | Left Femur | Right Femur |
|---|---|---|
| Driver | 1316 lbf | 1673 lbf |
| Passenger | 706 lbf | 1097 lbf |

### Head Injury Criteria[1]

| | HIC | Time $t_1$ | Time $t_2$ |
|---|---|---|---|
| Driver | 233 | 93.5 ms | 129.5 ms |
| Passenger | 366 | 108.1 ms | 120.6 ms |

### Chest Maximum Resultant Acceleration[2]

| | Acceleration | Time $t_1$ | Time $t_2$ |
|---|---|---|---|
| Driver | 41.9 g | 102.2 ms | 105.3 ms |
| Passenger | 41.1 g | 110.2 ms | 113.3 ms |

### Maximum Chest Deflection

| | |
|---|---|
| Driver | 1.4 in |
| Passenger | 0.4 in |

### Neck Injury Criteria

| | Flexion Moment | Extension Moment | Axial Tension Force | Axial Compression Force | Maximum Fore/ Aft Shear Force |
|---|---|---|---|---|---|
| Driver | 33.1 N·m | 16.4 N.m | 1097 N | 2561 N | 787 N[3] |
| Passenger | 56.6 N·m | 25.8 N·m | 943 N | 3929 N | 1199 N[3] |

[1] As defined in FMVSS No. 208
[2] Defined as equal to or exceeding 0.003 sec. duration
[3] Maximum output of channel is positive (head rearward, chest forward)

## Table 7
## FMVSS 208 SEAT BELT WARNING SYSTEM CHECK

NHTSA NO.: CW0209 Technician: M. Tonneman Date: 02/19/98

Complete the following to determine which seat belt warning system option (S7.3(a)(1)) or (S7.3(a)(2)) is used. (Manufacturers may use either option.)

A. With occupant in driver's position and lap belt in stowed position and ignition switch placed in "Start/On" position:

A.1 S7.3(a)(1)
Time duration of audible warning signal = 6 seconds
(4 to 8 seconds)

Time duration of reminder light operation = 60 seconds
(no less than 60 seconds)

A.2 S7.3(a)(2)
Time duration of audible warning signal = 6 seconds
(4 to 8 seconds) (see 49 USCS @ 30124)

Time duration of reminder light operation = 60 seconds
(4 to 8 seconds)

B. With occupant in driver's position and lap belt in use and the ignition switch placed in "Start/On" position:

B.1 S7.3(a)(1)
Time duration of audible warning signal = 0 seconds
(audible warning should not operate)

Time duration of reminder light operation = 0 seconds
(reminder light does not operate)

B.2 S7.3(a)(2)
Time duration of audible warning signal = 0 seconds
(audible warning should not operate)

Time duration of reminder light operation = 0 seconds
(4 to 8 seconds)

C. Note wording of visual warning:
Fasten Seat Belt _____
Fasten Belt _____
Symbol 101 ☒

## Table 8
## FMVSS 208 LABELING AND DRIVERS MANUAL INFORMATION

NHTSA NO.: CW0209 Technician: M. Tonneman Date: 02/23/98
Locate label which describes manufacturer's maintenance or replacement schedule for crash deployed occupant protection system.

Describe location: N/A

The manufacturer's recommended schedule is to replace ☐ or repair ☐ this system.

A. By _____ month, _____ year

B. By _____ miles

C. Or after a time interval of _____ months or _____ years.

Note: There was no label describing the manufacturer's maintenance or replacement schedule.

Were appropriate instructions concerning maintenance and/or replacement of this system provided?
Yes-☐; No-☐

Was a description of the functional operation of the system provided?
Yes-☐; No-☐

Is there a reference to the instructions and description of the system on the label?
Yes-☐; No-☐

Was an owner's manual provided?
Yes-☒; No-☐

Did the owner's manual contain appropriate information concerning maintenance and/or replacement and a description of the functional operation of the system?
Yes-☒; No-☐

Note: The manufacturer's owner's manual states that routine maintenance of the air bag is not required (Page 172).

## Table 9
## FMVSS 208 READINESS INDICATOR

NHTSA NO.: CW0209 Technician: M. Tonneman Date: 02/23/98

An occupant restraint system that deploys in the event of a crash shall have a monitoring system with a readiness indicator. A totally mechanical system is exempt from this requirement. (11/8/94 legal interpretation)

Is the system totally mechanical?

Yes-☐; No-☒

Describe the location of the readiness of the readiness indicator: Right side of the instrument cluster.

Is the readiness indicator clearly visible to the driver?

Yes-☒; No-☐

Is a list of the element in the occupant restraint system, being monitored by the readiness indicator, provided?

Yes-☒; No-☐;

## Table 10
## FMVSS 208 REAR OUTBOARD SEATING POSITION SEAT BELTS

Do all rear outboard seating positions have type 2 seat belts?

Yes-☒; No-☐;

If NO, describe the seat belt installed, the seat location, and any other information about the seat that would explain why a type 2 belt was not installed.

## Table 11
## FMVSS 208 Lap Belt Lockability

Passenger cars, trucks, buses, and multipurpose passenger vehicles with a GVWR of 10,000 pounds or less. (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats or seats that can be adjusted to forward-facing **and** that has seat belt retractors that are not automatic retractors. (S7.1.1.5(c))

NHTSA NO.: CW0209 Technician: B. Arn & M. Tonneman Date: 02/20/98

DESIGNATED SEATING POSITION: Right front passenger seat

☒1. Record test seat position. Mid
(S7.1.1.5(c)(1)) (Any position is acceptable.)

☒2. Buckle the seat belt. (S7.1.1.5(c)(1))

☒3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))

☒4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☒Yes ☐No

6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☒Yes-Pass ☐**No-Fail**

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. Tononeman Date: 02/20/98

DESIGNATED SEATING POSITION: Right front passenger seat.

☒7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))

☒8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))

☒9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))

☒10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 69.5 inches.

☒11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing

☒12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal. (S7.1.1.5(c)(4))
Measured force application angle 10 degrees. (Spec. 5~15 degrees)

☒13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4))
Measured distance between A and B 37.5 inches.

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. TonnemanDate: 02/20/98

DESIGNATED SEATING POSITION: Right front passenger seat.

☒14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline if the webbing. (S7.1.1.5(c)(5))

Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 38.5 inches (7.1.1.5(c)(6))

☒15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less?

14-13=1.0 inches ☒Yes-Pass ☐**No-Fail**

☐16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7))

10-14=31.0 inches. ☒Yes-Pass ☐**No-Fail**

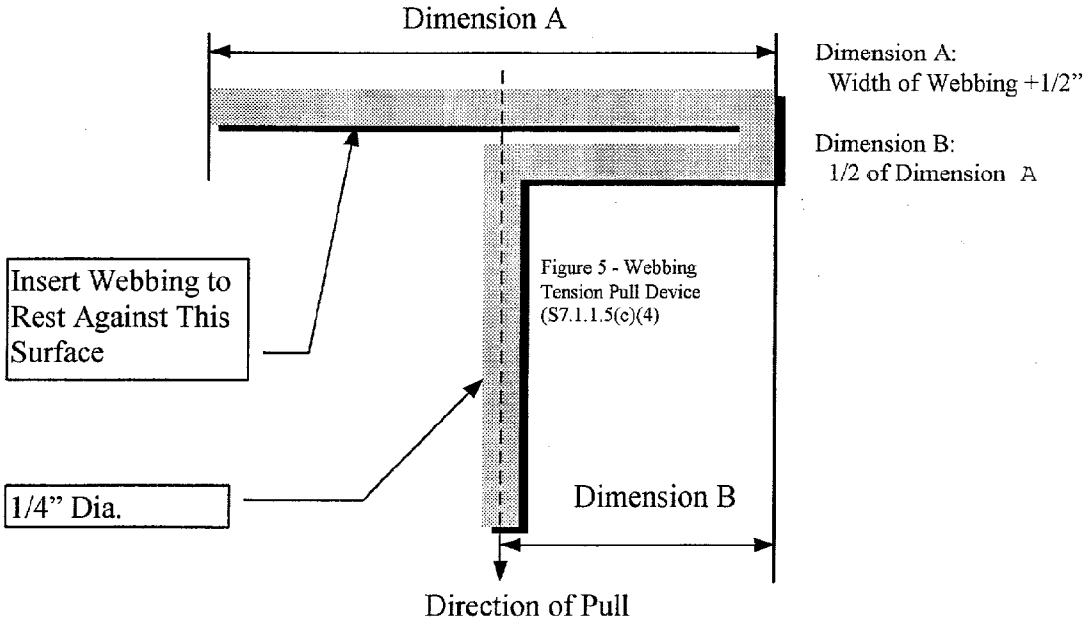



Figure 5 - Webbing Tension Pull Device (S7.1.1.5(c)(4)

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd

Passenger cars, trucks, buses, and multipurpose passenger vehicles with a GVWR of 10,000 pounds or less. (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats or seats that can be adjusted to forward-facing **and** that has seat belt retractors that are not automatic retractors. (S7.1.1.5(c))

NHTSA NO.: CW0209 Technician: B. Arn & M. Tonneman Date: 02/20/98

DESIGNATED SEATING POSITION: Left mid seat

☒1. Record test seat position. Normal - only 1 position (S7.1.1.5(c)(1)) (Any position is acceptable.)

☒2. Buckle the seat belt. (S7.1.1.5(c)(1))

☒3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))

☒4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☒Yes ☐No

6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☒Yes-Pass ☐**No-Fail**

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. Tononeman Date: 02/20/98

DESIGNATED SEATING POSITION: Left mid seat.

☒7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))

☒8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))

☒9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))

☒10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 67.5 inches.

☒11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing

☒12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal. (S7.1.1.5(c)(4))
Measured force application angle 10 degrees. (Spec. 5~15 degrees)

☒13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4))
Measured distance between A and B 32.5 inches.

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. TonnemanDate: 02/20/98

DESIGNATED SEATING POSITION: Left mid seat

☒14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline if the webbing. (S7.1.1.5(c)(5))

Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 33.25 inches (7.1.1.5(c)(6))

☒15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less?

14-13=.75 inches ☒Yes-Pass ☐**No-Fail**

☐16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7))

10-14=34.25 inches. ☒Yes-Pass ☐**No-Fail**

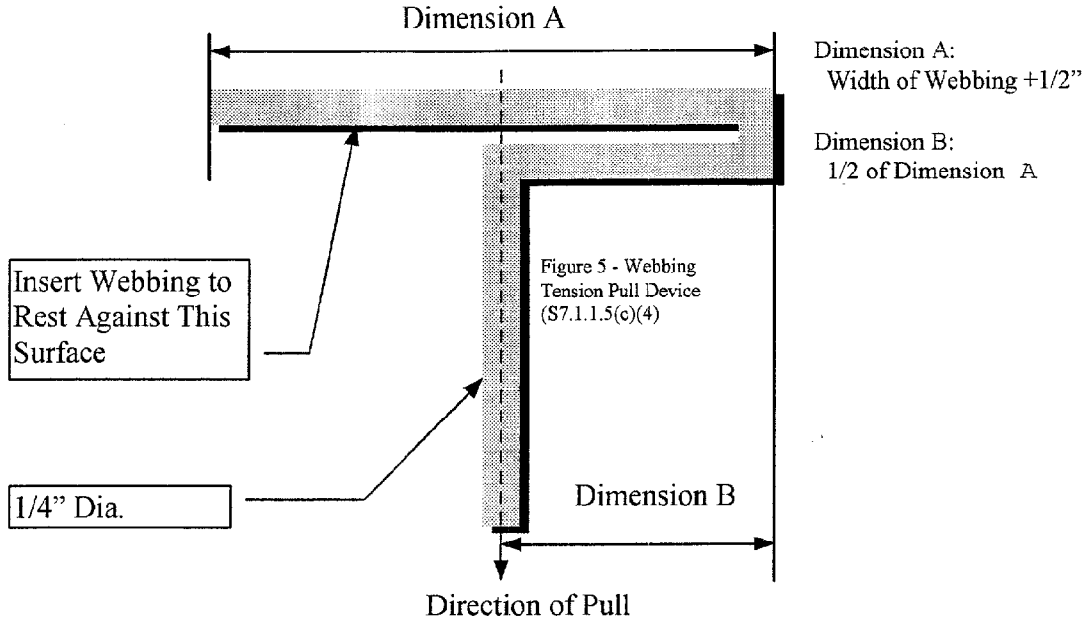



Figure 5 - Webbing Tension Pull Device (S7.1.1.5(c)(4)

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd

Passenger cars, trucks, buses, and multipurpose passenger vehicles with a GVWR of 10,000 pounds or less. (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats or seats that can be adjusted to forward-facing **and** that has seat belt retractors that are not automatic retractors. (S7.1.1.5(c))

NHTSA NO.: CW0209 Technician: B. Arn & M. Tonneman Date: 02/20/98

DESIGNATED SEATING POSITION: Right mid seat

☒1. Record test seat position. Normal - only a position (S7.1.1.5(c)(1)) (Any position is acceptable.)

☒2. Buckle the seat belt. (S7.1.1.5(c)(1))

☒3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))

☒4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☒Yes ☐No

6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☒Yes-Pass ☐**No-Fail**

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. Tononeman Date: 02/20/98

DESIGNATED SEATING POSITION: Right mid seat.

☒7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))

☒8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))

☒9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))

☒10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 61.0 inches.

☒11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing

☒12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal. (S7.1.1.5(c)(4))
Measured force application angle 10 degrees. (Spec. 5~15 degrees)

☒13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4))
Measured distance between A and B 26.0 inches.

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. TonnemanDate: 02/20/98

DESIGNATED SEATING POSITION: Right mid seat.

☒14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline if the webbing. (S7.1.1.5(c)(5))

Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 26.4 inches (7.1.1.5(c)(6))

☒15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less?

14-13=0.4 inches ☒Yes-Pass ☐**No-Fail**

☐16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7))

10-14=34.6 inches. ☒Yes-Pass ☐**No-Fail**

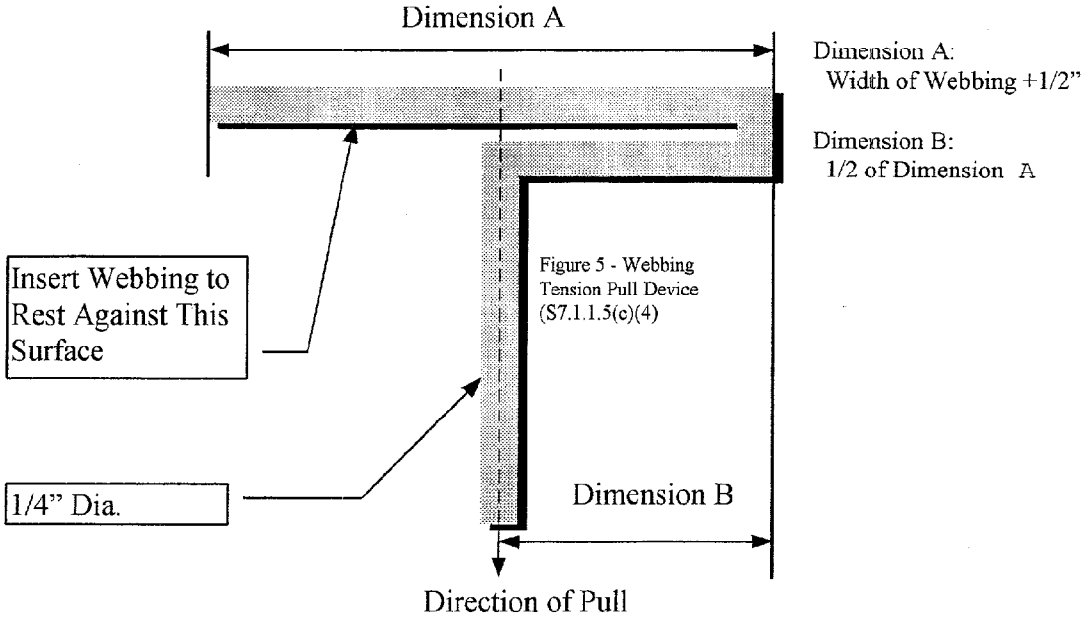



Figure 5 - Webbing Tension Pull Device (S7.1.1.5(c)(4)

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd

Passenger cars, trucks, buses, and multipurpose passenger vehicles with a GVWR of 10,000 pounds or less. (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats or seats that can be adjusted to forward-facing **and** that has seat belt retractors that are not automatic retractors. (S7.1.1.5(c))

NHTSA NO.: CW0209 Technician: B. Arn & M. Tonneman Date: 02/20/98

DESIGNATED SEATING POSITION: Left rear seat

☒1. Record test seat position. Normal - only 1 position (S7.1.1.5(c)(1)) (Any position is acceptable.)

☒2. Buckle the seat belt. (S7.1.1.5(c)(1))

☒3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))

☒4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☒Yes ☐No

6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☒Yes-Pass ☐**No-Fail**

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. Tononeman Date: 02/20/98

DESIGNATED SEATING POSITION: Left rear seat.

☒7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))

☒8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))

☒9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))

☒10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 67.5 inches.

☒11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing

☒12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal. (S7.1.1.5(c)(4))
Measured force application angle 10 degrees. (Spec. 5~15 degrees)

☒13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4))
Measured distance between A and B 28.5 inches.

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. TonnemanDate: 02/20/98

DESIGNATED SEATING POSITION: Left rear seat.

☒14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline if the webbing. (S7.1.1.5(c)(5))

Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 29.0 inches (7.1.1.5(c)(6))

☒15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less?

14-13=0.5 inches ☒Yes-Pass ☐**No-Fail**

☐16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7))

10-14=38.5 inches. ☒Yes-Pass ☐**No-Fail**

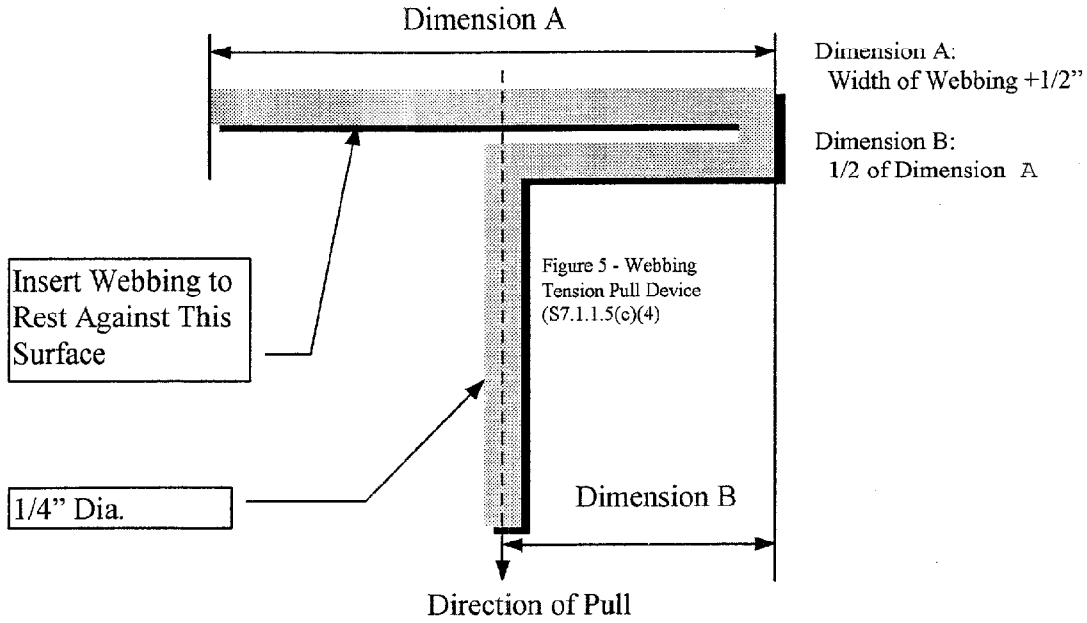



Figure 5 - Webbing Tension Pull Device (S7.1.1.5(c)(4)

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd

Passenger cars, trucks, buses, and multipurpose passenger vehicles with a GVWR of 10,000 pounds or less. (S7.1.1.5)

Complete one of these forms for **each** designated seating position with forward-facing seats or seats that can be adjusted to forward-facing **and** that has seat belt retractors that are not automatic retractors. (S7.1.1.5(c))

NHTSA NO.: CW0209 Technician: B. Arn & M. Tonneman Date: 02/20/98

DESIGNATED SEATING POSITION: Right rear seat

☒1. Record test seat position. Normal - only 1 position (S7.1.1.5(c)(1)) (Any position is acceptable.)

☒2. Buckle the seat belt. (S7.1.1.5(c)(1))

☒3. Complete any procedures recommended in the vehicle owner's manual to activate any locking feature. (S7.1.1.5(c)(1))

☒4. Does the lap belt portion of the seat belt in the forward-facing seat or seat that can be adjusted to forward-facing consist of a locking device that does NOT have to be attached by the vehicle user to the seat belt webbing, retractor, or any other part to the vehicle? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒5. Does the lap belt portion of the seat belt in the forward-facing seat or seat the can be adjusted to forward-facing consist of a locking device that does NOT require inverting, twisting or deforming of the belt webbing? (S7.1.1.5(a)) ☒Yes-Pass ☐**No-Fail**

☒6. Does the vehicle user need to take some action to activate the locking feature on the lap belt portion of the seat belt in any forward-facing seat or seat that can be adjusted to forward-facing? If yes, go to 6.1. If no, go to 7. ☒Yes ☐No

6.1 Does the vehicle owner's manual include a description in words and/or diagrams describing how to activate the locking feature so that the seat belt assembly can tightly secure a child restraint system and how to deactivate the locking feature to remove the child restraint system. (S7.1.1.5(b)) ☒Yes-Pass ☐**No-Fail**

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. Tononeman Date: 02/20/98

DESIGNATED SEATING POSITION: Right rear seat.

☒7. Locate a reference point a on the seat belt buckle. (S7.1.1.5(c)(2))

☒8. Locate a reference point B on the attachment hardware or retractor assembly at the other end of the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2))

☒9. Adjust the lap belt or lap belt portion of the seat belt assembly according to any procedures recommended in the vehicle owner's manual to activate any locking feature so that the webbing between points A and B is at the maximum length allowed by the belt system. (S7.1.1.5(c)(2))

☒10. Measure and record the distance between points A and B along the longitudinal centerline of the webbing for the lap belt or lap belt portion of the seat belt assembly. (S7.1.1.5(c)(2)) Measured distance between A and B 68.5 inches.

☒11. Readjust the belt system so that the webbing between points A and B is at any length that is 5 inches or more shorter than the maximum length of the webbing

☒12. To the lap belt or lap belt portion of the seat belt assembly, apply a preload of 10 pounds using the webbing tension pull device in figure 5. Apply the load in a vertical plane parallel to the longitudinal axis of the vehicle and passing through the seating reference point of the designated seating position. Apply the preload in a horizontal direction toward the front of the vehicle with a force application angle of not less than 5 degrees nor more than 15 degrees above the horizontal. (S7.1.1.5(c)(4))
Measured force application angle 10 degrees. (Spec. 5~15 degrees)

☒13. Measure the length between points A and B along the longitudinal centerline of the webbing while the preload is being applied. (S7.1.1.5(c)(4))
Measured distance between A and B 33.0 inches.

## Table 11
## FMVSS 208 Lap Belt Lockability, Cont'd.

NHTSA NO.: CW0209 Technician: B. Arn & M. Tonneman Date: 02/20/98

DESIGNATED SEATING POSITION: Right rear seat.

☒14. Increase the load to 50 pounds at a rate of no more than 50 pounds per second. Attain the load in not more than 5 seconds. (If webbing sensitive emergency locking retractors are installed as part of the lap belt or lap belt portion of the seat belt assembly, apply the load at a rate less than the threshold value for lock-up specified by the manufacturer.) Maintain the load for at least 5 seconds. Measure and record the distance between points A and B along the longitudinal centerline if the webbing. (S7.1.1.5(c)(5))

Record onset rate 20 lb/sec (spec. 10 ~50 lb/sec)

The measured distance between A and B is 33.5 inches (7.1.1.5(c)(6))

☒15. Subtract the measurement in 13 from the measurement in 14. Is the difference 2 inches or less?

14-13=0.5 inches ☒Yes-Pass ☐**No-Fail**

☐16. Subtract the measurement in 14 from the measurement in 10. Is the difference 3 inches or more? (7.1.1.5(c)(7))

10-14=35.0 inches. ☒Yes-Pass ☐**No-Fail**

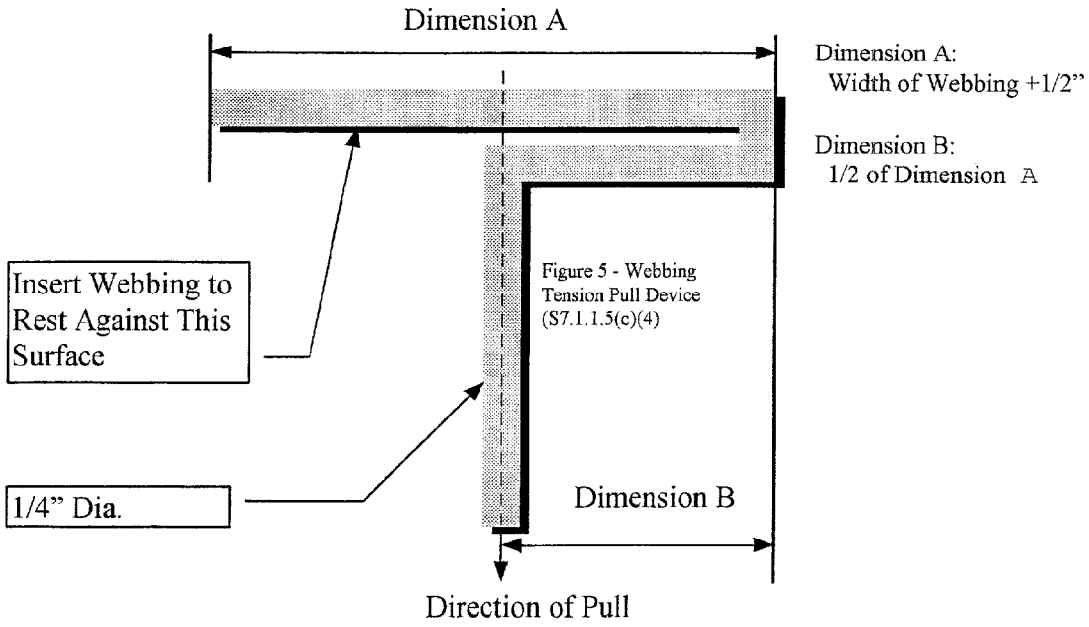



Figure 5 - Webbing Tension Pull Device (S7.1.1.5(c)(4)

**Table 12**
**FMVSS 208 Air Bag Labels**

NHTSA NO.: CW0209 Technician: M. Tonneman Date: 02/20/98

1. Air Bag Maintenance Label and Owner's Manual Instructions:

1.1 Does the manufacturer recommend periodic maintenance or replacement of the air bag?

☐ Yes (Go to 1.2)

☒ No (Go to 2)

1.2 Does the Vehicle have a maintenance or replacement label?

☐ Yes-Pass ☐ **No-Fail**

1.3 Does the label contain one of the following? ☐ Yes-Pass ☐ **No-Fail**

☐ Schedule on label specifies month and year

☐ Schedule on label specifies vehicle mileage

☐ Schedule on label specifies interval measured form date on certification label

1.4 Is the label permanently affixed within the passenger compartment?

☐ Yes-Pass ☐ **No-Fail**

1.5 Is the label lettered in English?

☐ Yes-Pass ☐ **No-Fail**

1.6 Is the label in block capitals and numerals?

☐ Yes-Pass ☐ **No-Fail**

1.7 Are the letters and numerals at 3/32 inch high?

☐ Yes-Pass ☐ **No-Fail**

1.8 Does the owner's manual set forth the recommended schedule for maintenance or replacement?

☐ Yes-Pass ☐ **No-Fail**

2. Does the Vehicle:

2.1 provide an automatic means to ensure that the air bag does not deploy when a child seat or child with a total mass of 30 kg or less is present on the front outboard seat? ☐ Yes ☒ No

**Table 12**
**Air Bag Labels, Cont'd.**

2.2 incorporate sensors, other than or in addition to weight sensors, which automatically prevent the passenger air bag from deploying in situations in which it might have an adverse effect on infants in rear-facing child seat, and unbelted or improperly belted children?

☐ Yes ☒ No

2.3 have a passenger air bag designed to deploy in a manner that does not create a risk of serious injury to infants in rear-facing child seats, and unbelted or improperly belted children?

☐ Yes ☒ No

**If yes to 2.1, or 2.2, or 2.3,** the vehicle is not required to have a Sun Visor Warning Label (S4.5.1(b)), an air bag alert label (S4.5.1(c)) or a label on the dash (S4.5.1(e)) and **this check sheet is complete. (S4.5.1) If no to 2.1, 2.2, and 2.3, go to 3.**

3. Sun Visor Warning Label

3.1 Is the label permanently affixed (may be permanent marking or molding) to either side of the sun visor at each front outboard seating position with an air bag?

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☐ N/A ☒ Yes-Pass ☐ **No-Fail**

3.2 Does the label conform in content **(vehicles without back seats may omit the statement: "The BACK SEAT is the SAFEST place for children.")** (S4.5.1(b)(2)(v)) to the label shown in either Figure 6a or 6b as appropriate at each front outboard seating position with an air bag? (S4.5.1(b)(2))

3.2.1 Dual air bags

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

## Table 12
## Air Bag Labels, Cont'd.

3.2.1 Vehicles with driver air bag ONLY - either 3.2.1 or 3.2.2 is applicable, not both. (S4.5.1(b)(2)(iv))

3.2.1 Does the label conform on content to the label shown in either Figure 6a or 6b as appropriate?

☒ N/A

Driver side ☐ Yes-Pass ☐ **No-Fail**

3.2.2 Does the label conform in content to the label shown in Figure 6a where the label can be modified to omit the pictogram and the message may read:

DEATH or SERIOUS INJURY can occur.

- Sit as far back as possible from the air bag.
- ALWAYS use SEAT BELTS and CHILD RESTRAINTS.
- The BACK SEAT is the SAFEST place for children.

☒ N/A

Driver side ☐ Yes-Pass ☐ **No-Fail**

**Table 12**
**Air Bag Labels, Cont'd.**

**SUN VISOR LABEL VISIBLE WHEN VISOR IS IN DOWN POSITION**

LABEL OUTLINE, VERTICAL AND HORIZONTAL LINE BLACK

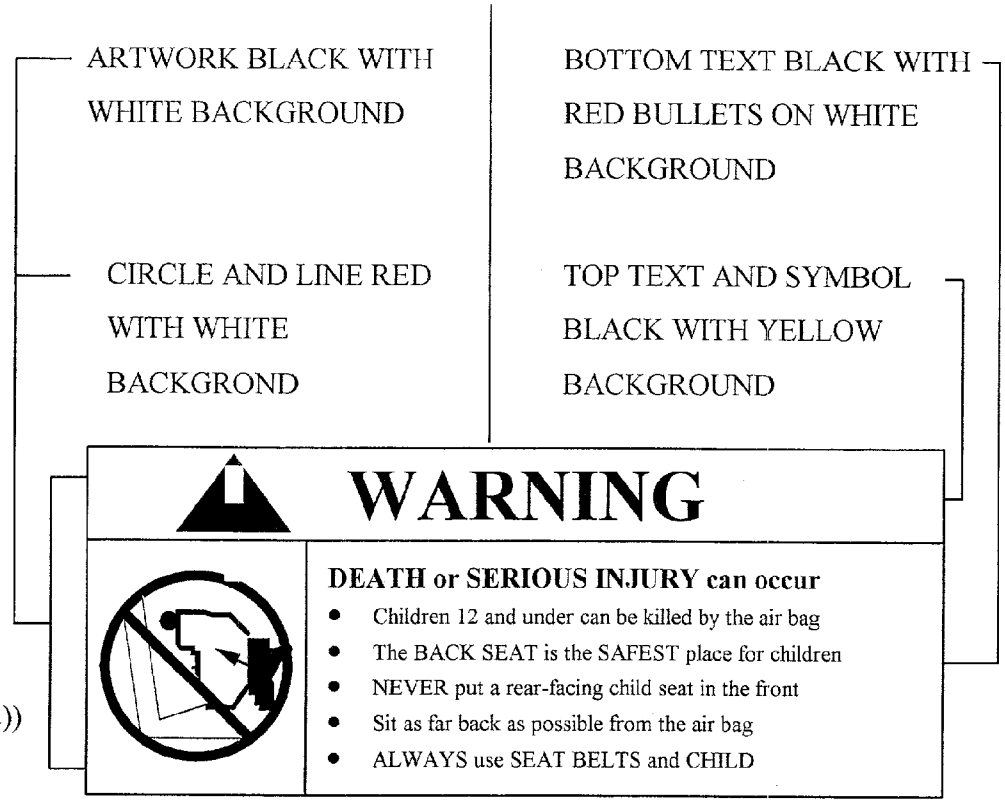



Figure 6a
(S4.5.1(b)(2))

**Table 12**
**Air Bag Labels, Cont'd.**

**SUN VISOR LABEL VISIBLE WHEN VISOR IS IN DOWN POSITION**

LABEL OUTLINE, VERTICAL AND HORIZONTAL LINE BLACK

ARTWORK BLACK WITH WHITE BACKGROUND

BOTTOM TEXT BLACK WITH RED BULLETS ON WHITE BACKGROUND

CIRCLE AND LINE RED WITH WHITE BACKGROND

TOP TEXT AND SYMBOL BLACK WITH YELLOW BACKGROUND

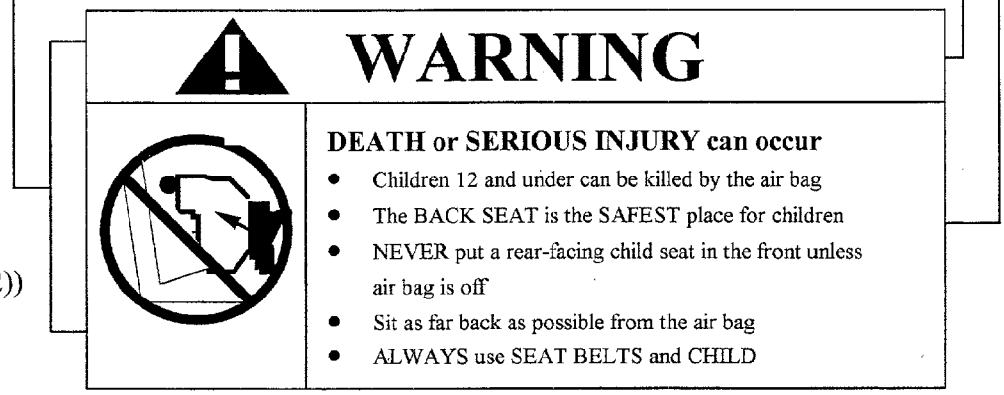



Figure 6b
(S4.5.1(b)(2))

3.3 Is the driver side label heading area yellow with the word "warning" and the alert symbol in black? (S4.5.1.(b)(2)(i))

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

3.4 Is the message white with black text? (S4.5.1 (b)(2)(ii))

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

3.5 Is the message area at least 30 $cm^2$? (S4.5.1(b)(2)(ii))

Actual message area 32 $cm^2$

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

## Table 12
## Air Bag Labels, Cont'd.

3.6 Is the pictogram black with a red circle and slash on a white background? (S4.5.1(b)(2)(iii)) & (S4.5.1(b)(2)(iv))

For vehicles with driver side air bag ONLY ☐ N/A

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

3.7 Is the pictogram at least 30 mm in diameter? (S4.5.1(b)(2)(iii))
Actual diameter **31** mm

For vehicles with driver side air bag ONLY ☐ N/A

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

3.8 Is the same side of the sun visor to which the sun visor label is affixed free of other information with the exception of an air bag maintenance label? (S4.5.1(b)(3))

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

3.9 Is the sun visor free of other information about air bags or the need to wear seat belts with the exception of the air bag alert label or the utility vehicle label?

Driver side ☒ Yes-Pass ☐ **No-Fail**

Passenger side ☒ Yes-Pass ☐ **No-Fail**

4. Air Bag Alert Label

4.1 Is the Sun Visor Warning Label visible when the sun visor is in the stowed position?
☒Yes ☐No **If yes, go to 5**

4.2 does the label conform in content to the label shown in Figure 6c? (S4.5.1(c)(2))

☒ Yes-Pass ☐ **No-Fail**

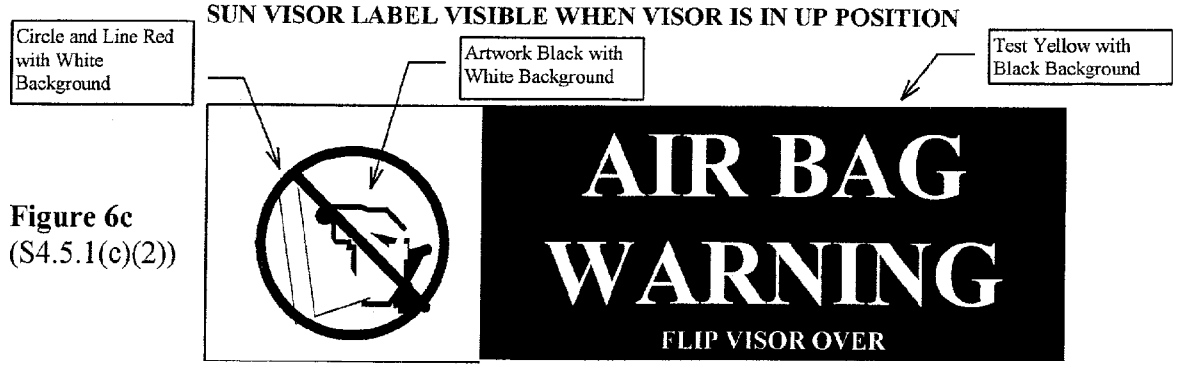



**Figure 6c**
(S4.5.1(c)(2))

**Table 12**
**Air Bag Labels, Cont'd.**

4.3 Is the message area black with yellow text? (S4.5.1(c)(2)(i))

☒ Yes-Pass ☐ **No-Fail**

4.4 Is the message area at least 20 $cm^2$? (S4.5.1(c)(2)(i))

Actual message area **20.0** $cm^2$ ☒ Yes-Pass ☐ **No-Fail**

4.5 Is the pictogram black with a red circle and slash on a white background? (S4.5.1(c)(2)(ii))

For vehicles with driver side air bag ONLY ☐ N/A

☒ Yes-Pass ☐ **No-Fail**

4.6 Is the pictogram at least 20 mm in diameter? (S4.5.1(c)(2)(ii))
Actual diameter is **25.0** mm

For vehicles with driver side air bag ONLY ☐ N/A

☒ Yes-Pass ☐ **No-Fail**

5. Label On the Dash

5.1 Does the vehicle have a passenger air bag?
☒Yes ☐No

**If no, this check list is complete.**

5.2 Does the vehicle have a label on the dash or steering wheel hub? (S4.5.1(e))

☐ Yes-Pass ☐ **No-Fail**

Note: Vehicle had 121 miles at time of delivery. Label on the dash or steering wheel hub was missing when received at TRC.

5.3 Does the label conform in content **(vehicles without back seats may omit the statement: "The back seat is the safest place for children 12 and under."** (S4.5.1(e)(iii)) to the label shown in Figure 7? (S4.5.1(e))

☐ Yes-Pass ☐ **No-Fail**

**Figure 7**
(S4.5.1(e))

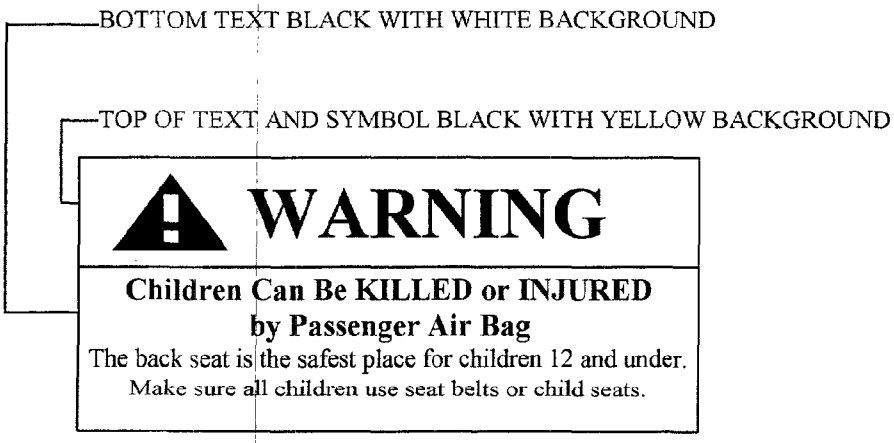


**Table 12**
**Air Bag Labels, Cont'd.**

5.4 Is the heading area yellow with the word "warning" and the alert symbol in black? (S4.5.1(e)(i))

☐ Yes-Pass ☐ **No-Fail**

5.5 Is the message white with black text? (S4.5.1(e)(ii))

☐ Yes-Pass ☐ **No-Fail**

5.6 Is the message area at least 30 $cm^2$? (S4.5.1(e)(ii))
Actual message area ___ $cm^2$

☐ Yes-Pass ☐ **No-Fail**

**Table 13**
**FMVSS 208 Seat Belt Comfort And Convenience Test Summary**
**Front Outboard Designated Seating Positions**

Test Vehicle NHTSA No.: CW0209
Vehicle Model Year/Make/Model/Body Style: 1998/Ford/Windstar/4x2 regular cab
Date of Comfort and Convenience Check: 02/20/98
Technician Performing Check: M. Tonneman & V. Watters
GVWR: 5060 pounds

- Automatic seat belts installed in any vehicle other than walk-in van-type vehicles, which has a gross vehicle weight rating of 10,000 pounds or less, and is manufactured on or after September 1, 1986, shall meet the requirements for convenience hooks, webbing tension-relieving devices, and belt contact force.

- Manual seat belts installed for compliance with this standard in front outboard designated seating positions of any vehicle, other than walk-in van-type vehicles, which has a gross vehicle rating of 10,000 pounds or less, and is manufactured after September 1, 1989, shall meet the requirements for belt contact force, latch plate access, retraction and seat belt guides and hardware.

1. Was vehicle equipped with: (S7.4)

   **AUTOMATIC SEAT BELTS** Yes-☐; No-☒

   If yes, go to requirements for Convenience Hooks (S7.4.1), Webbing Tension-Relieving Devices (S7.4.2), Belt Contact Force (S7.4.3)

   **MANUAL SEAT BELTS IN OUTBOARD FRONT SEATS EXCLUDING TYPE 2 MANUAL BELTS IN PASSENGER CARS*** Yes-☒; No-☐

   If yes, go to requirements for Belt Contact Force (S7.4.3), Latchplate Access (S7.4.4), Retraction (S7.4.5)

If any problems are encountered while checking the vehicle to ascertain that it meets the comfort and convenience requirements of FMVSS No. 208 contact the COTR immediately.

* If the seat belts are voluntarily installed by the manufacturer they do not have to comply.

## Table 13
## FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.
## Belt Contact Force (S7.4.3)

### FRONT OUTBOARD DRIVER

1. Do not measure the belt contact force if the manual or automatic seat belt assemblies in the vehicle incorporate a webbing tension-relieving device. ☒ Check

2. Seats are adjusted according to instructions in S8, "Test conditions" of FMVSS 208. ☒ Check

3. The test dummies are positioned according to dummy position placement instructions in Appendix B or C. ☒ Check

4. Fasten the seat belt latch. Close the vehicle's adjacent door, pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. The contact force is **0.6** pounds. Contact the COTR if the contact force exceeds 0.7 pounds.

### FRONT OUTBOARD PASSENGER

1. Do not measure the belt contact force if the manual or automatic seat belt assemblies in the vehicle incorporate a webbing tension-relieving device. ☒ Check

2. Seats are adjusted according to instructions in S8, "Test conditions" of FMVSS 208. ☒ Check

3. The test dummies are positioned according to dummy position placement instructions in Appendix B or C. ☒ Check

4. Fasten the seat belt latch. Close the vehicle's adjacent door, pull either 12 inches of belt webbing or the maximum available amount of belt webbing, whichever is less, from the retractor and then release it, allowing the belt webbing to return to the dummy's chest. Locate the point where the centerline of the upper torso belt webbing crosses the midsagittal line on the dummy's chest. At that point pull the belt webbing out 3 inches from the dummy's chest and release until it is within one inch from the dummy's chest. The contact force is **0.5** pounds. Contact the COTR if the contact force exceeds 0.7 pounds.

## Table 13
## FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.
## Latchplate Access (S7.4.4)

**FRONT OUTBOARD DRIVER**

1. Position latch plate in its normal stowed position. ☒ Check

2. Position adjustable anchorages, if any, to manufactures nominal design position for a 50th percentile dummy. ☒ Check

3. Position the test dummy in the right front passenger seat in its forward most adjustment position and with its arms removed. ☒ Check

4. Attach the inboard and outboard reach string following the instructions on Figure 2C for Part 572E test device outlined in the test procedure. 1 inch forward of true mid. ☒ Check

5. Extend each line backward and outboard to generate arcs of the reach envelope of the test dummy's arms. With the latchplate in the normal stowed position check to assure that the latchplate is within the reach envelope. ☒ Check

6. Close the vehicle door. Using the clearance test block, specified in Figure 3C of the test procedure, determine if there is sufficient clearance between the vehicle seat and the side of vehicle to allow the test block to move unhindered to the latchplate or buckle. ☒ Check

7. Was the latch plate accessible? Yes-☒ Pass; No- ☐ **Fail**
   In board and head reach strings did not reach latch plate

**FRONT OUTBOARD PASSENGER**

1. Position latch plate in its normal stowed position. ☒ Check

2. Position adjustable anchorages, if any, to manufactures nominal design position for a 50th percentile dummy. ☒ Check

3. Position the test dummy in the left front driver seat in its forward most adjustment position and with its arms removed. 3 notches back from full forward. ☒ Check

4. Attach the inboard and outboard reach string following the instructions on Figure 2C for Part 572E test device outlined in the test procedure. ☒ Check

5. Extend each line backward and outboard to generate arcs of the reach envelope of the test dummy's arms. With the latchplate in the normal stowed position check to assure that the latchplate is within the reach envelope. ☒ Check

6. Close the vehicle door. Using the clearance test block, specified in Figure 3C of the test procedure, determine if there is sufficient clearance between the vehicle seat and the side of vehicle to allow the test block to move unhindered to the latchplate or buckle. ☒ Check

7. Was the latch plate accessible? Yes-☒ Pass No- ☐ **Fail**

## Table 13
## FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.
## Retraction (S7.4.5)

**FRONT OUTBOARD DRIVER**

1. Seat and seat back are adjusted according to instructions in S8.1.2 and S8.1.3 ☒ Check

2. Use anthropomorphic test dummies whose arms have been removed and position the dummies n the front outboard designated seating positions according to instructions in Appendix B (P572E) and restrain the dummies using the belt systems for the positions being tested. ☒ Check

3. Outboard armrests which are capable of being stowed on vehicle seats shall be placed in their stowed position. ☒ Check

4. Check the option which applies to this test vehicle:
   (A) The torso and lap belt webbing of the seat belt system automatically retracts to a stowed position when the adjacent vehicle door is in an open position and the seat belt latch plate is released. ☒ Check

   (B) The torso and lap belt webbing of the seat belt system automatically retracts when the seat belt latch plate is released. ☒ Check

5. With the webbing and hardware in the stowed position close the door to assure that the webbing and hardware are prevented form being pinched. ☒ Check

6. If this test vehicle has an open body (without doors)) and has a belt system with a tension-relieving device, check to assure that the belt system fully retracts when the tension relieving device is manually deactivated. N/A

7. Notes: No armrests installed. Not an open body. No tension-relieving device.

**Table 13**
**FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.**
**Retraction (S7.4.5)**

**FRONT OUTBOARD PASSENGER**

1. Seat and seat back are adjusted according to instructions in S8.1.2 and S8.1.3 ☒ Check

2. Use anthropomorphic test dummies whose arms have been removed and position the dummies n the front outboard designated seating positions according to instructions in Appendix B (P572E) and restrain the dummies using the belt systems for the positions being tested. ☒ Check

3. Outboard armrests which are capable of being stowed on vehicle seats shall be placed in their stowed position. ☒ Check

4. Check the option which applies to this test vehicle:
   (A) The torso and lap belt webbing of the seat belt system automatically retracts to a stowed position when the adjacent vehicle door is in an open position and the seat belt latch plate is released. ☒ Check

   (B) The torso and lap belt webbing of the seat belt system automatically retracts when the seat belt latch plate is released. ☒ Check

5. With the webbing and hardware in the stowed position close the door to assure that the webbing and hardware are prevented form being pinched. ☒ Check

6. If this test vehicle has an open body (without doors)) and has a belt system with a tension-relieving device, check to assure that the belt system fully retracts when the tension relieving device is manually deactivated. N/A- ☐

7. Notes: No armrests installed. Not an open body. No tension-relieving device.

## Table 13
## FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.
## Seat Belt Guides And Hardware (S7.4.6)

**FRONT OUTBOARD DRIVER** **N/A**

The requirements for accessibility **DO NOT APPLY** to: Seat belt webbing is not designed to pass through the seat cushion or between the seat cushion and seat back.

1. Seats whose seat cushions are movable so that the seat back serves a function other than seating (S7.4.6.1(b)).

2. Seat that are removable.

3. Seats that are movable so that the space formerly occupied by the seat can be used for a secondary function.

If the seats in this vehicle are different than the criteria above, determine if:

1. Each manual seat belt assembly in a front designated seating position whose webbing is designed to pass through the seat cushion or between the seat cushion and seat back has one of the following three parts (the seat belt latchplate, the buckle, or the seat belt webbing) on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant.). ☐ Check

2. The remaining two seat belt parts are accessible under normal conditions. ☐ Check

3. The buckle and latchplate do not pass though the guides or conduits provided and fall behind the seat when the following occur in order:

   (A) The belt is completely retracted or, if the belt is non retractable, the belt is unlatched. ☐ Check

   (B) The seat is moved to any position to which it is designed to be adjusted. ☐ Check

   (C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position. ☐ Check

4. Is the inboard receptacle end of the seat belt assembly, installed in the outboard designated seating position, accessible with the center arm rest in any position to which it can be adjusted (without moving the arm rest)? Yes-☐; No-☐, N/A-☐

## Table 13
## FMVSS 208 Seat Belt Comfort And Convenience Test Summary, Cont'd.
## Seat Belt Guides And Hardware (S7.4.6)

**FRONT OUTBOARD PASSENGER N/A**

The requirements for accessibility **DO NOT APPLY** to: Seat belt webbing is not designed to pass through the seat cushion or between the seat cushion and seat back.

1. Seats whose seat cushions are movable so that the seat back serves a function other than seating (S7.4.6.1(b)).

2. Seat that are removable.

3. Seats that are movable so that the space formerly occupied by the seat can be used for a secondary function.

If the seats in this vehicle are different than the criteria above, determine if:

1. Each manual seat belt assembly in a front designated seating position whose webbing is designed to pass through the seat cushion or between the seat cushion and seat back has one of the following three parts (the seat belt latchplate, the buckle, or the seat belt webbing) on top of or above the seat cushion under normal conditions (i.e., conditions other than when belt hardware is intentionally pushed behind the seat by a vehicle occupant.). ☐ Check

2. The remaining two seat belt parts are accessible under normal conditions. ☐ Check

3. The buckle and latchplate do not pass though the guides or conduits provided and fall behind the seat when the following occur in order:

   (A) The belt is completely retracted or, if the belt is non retractable, the belt is unlatched. ☐ Check

   (B) The seat is moved to any position to which it is designed to be adjusted. ☐ Check

   (C) The seat back, if foldable, is folded forward as far as possible and then moved backward into position. ☐ Check

4. Is the inboard receptacle end of the seat belt assembly, installed in the outboard designated seating position, accessible with the center arm rest in any position to which it can be adjusted (without moving the arm rest)? Yes-☐; No-☐, N/A-☐

# Section 4.0

## Vehicle, Occupant, and Camera Measurements

Figure 2 Vehicle Target Locations

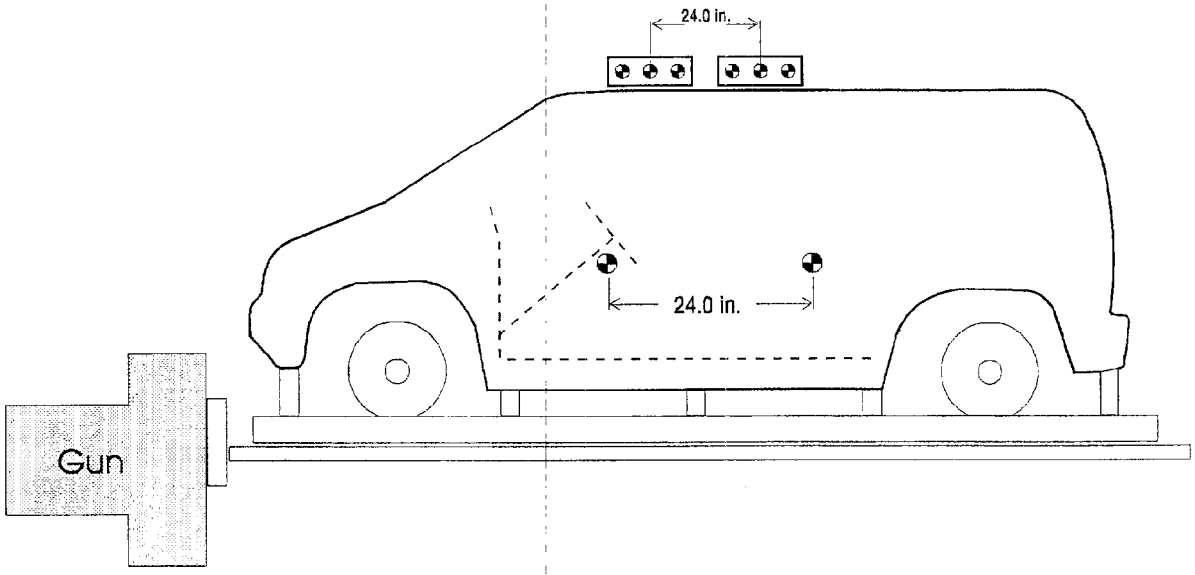


Figure 3 Dummy Measurement Locations for Front Seat Occupants

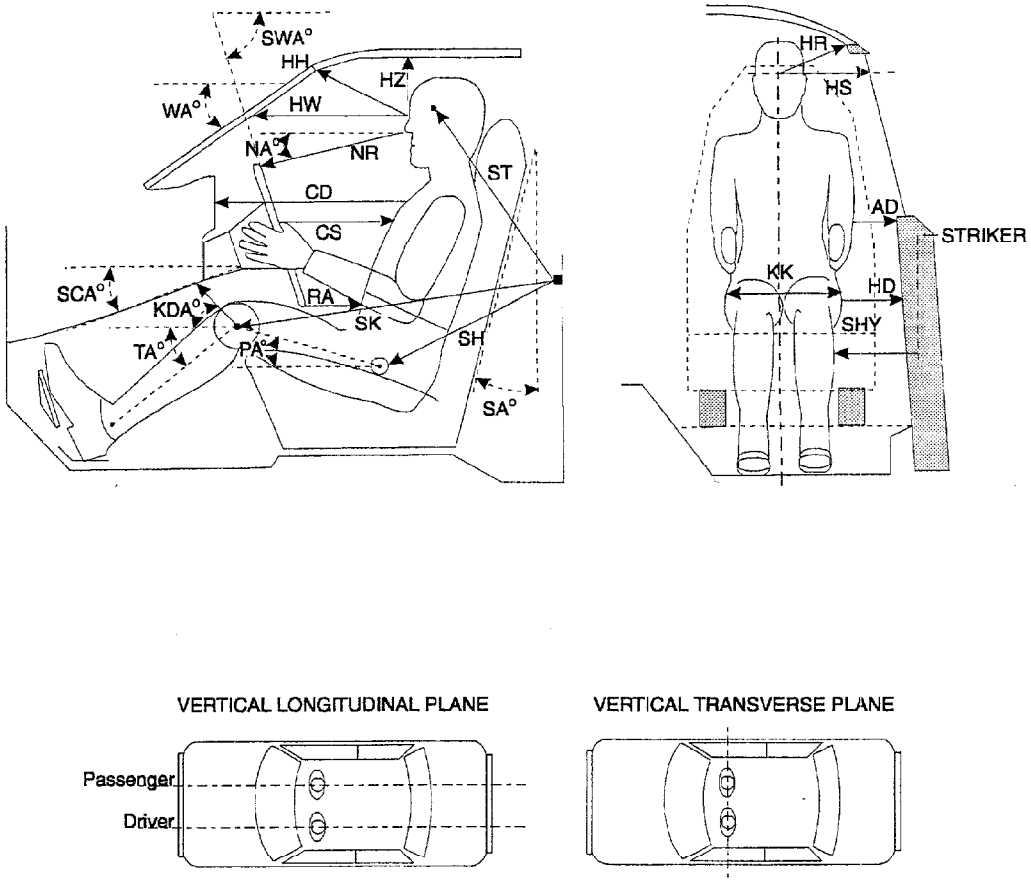


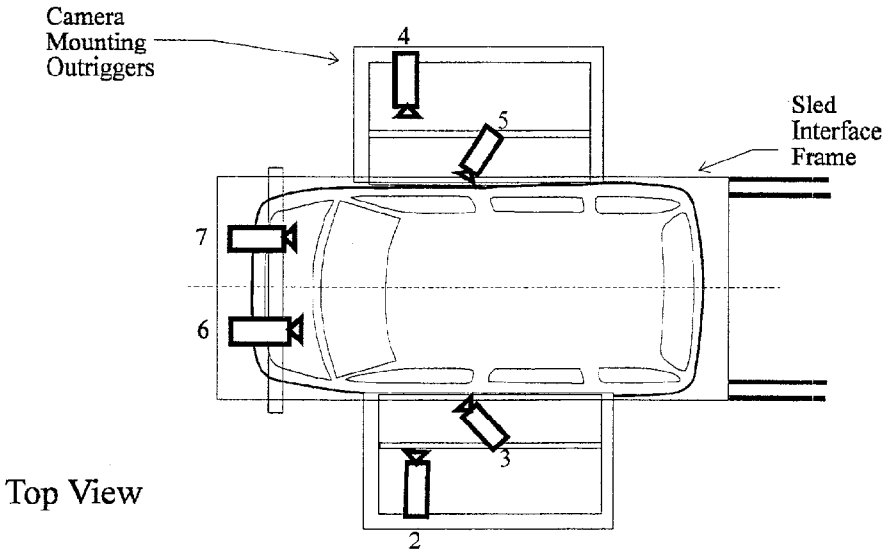
Table 14 Dummy Measurement Data for Front Seat Occupants

| Designation | Type of Measurement | Driver (Serial #230) | Passenger (Serial #314) |
|---|---|---|---|
| WA | Windshield angle | 31.7° | N/A |
| SWA | Steering wheel angle | 27.0° | N/A |
| SCA | Steering column angle | 25.0° | N/A |
| SA | Seat back angle | 22.3° | 22.7° |
| HZ | Head to roof | 7.7 in | 7.8 in |
| HH | Head to header | 16.0 in | 16.0 in |
| HW | Head to windshield | 23.8 in | 24.3 in |
| HR | Head to side header | 8.6 in | 8.3 in |
| NR | Nose to rim | 17.4 in | N/A |
| NA | Nose to rim angle | 15° | N/A |
| CD | Chest to dash | 22.7 in | 21.7 in |
| CS | Steering wheel to chest | 12.7 in | NA |
| RA | Rim to abdomen | 8.7 in | NA |
| KDL | Left knee to dash | 6.6 in | 5.6 in |
| KDR | Right knee to dash | 6.1 in | 5.9 in |
| KDA | Outboard knee to dash angle | 18° | 18° |
| PA | Pelvic angle | 21.3° | 20.8° |
| TA | Tibial angle | 49° | 52° |
| KK | Knee to knee | 11.7 in | 10.6 in |
| ST[1] | Striker to head | 26.3 in | 24.1 in |
| | Striker to head angle | -66.2° | -78.6° |
| SK[1] | Striker to knee | 29.6 in | 24.6 in |
| | Striker to knee angle | -1.8° | -3.6° |
| SH[1] | Striker to H-point | 14.5 in | 9.5 in |
| | Striker to H-point angle | 8.1° | 13.1° |
| SHY | Striker to H-point (Y dir.) | 9.7 in | 9.5 in |
| HS | Head to side window | 6.9 in | 6.0 in |
| HD | H-point to door | 13.1 in | 13.2 in |
| AD | Arm to door | 5.9 in | 4.6 in |

The seat back angle (SA°) is measured relative to vertical, all other angles are measured relative to horizontal.

[1] A negative angle indicates the measurement point was located above the striker.

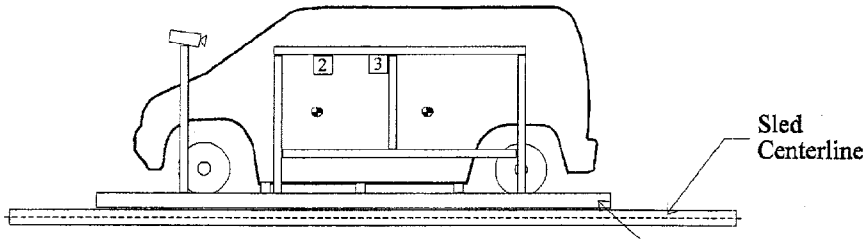
Figure 4 Camera Positions




Top View

ates:
#1 = 24 fps
All Others = 1,000 fps

Real-Time
Camera
1




Left Side View

Table 15 Motion Picture Camera Locations

Vehicle year/make/model/body style: 1998/Ford/Windstar/Van
Test number: 980220S

| Camera Number | View | Camera Positions[1] X | Y | Z | Camera Angle[2] | Film Plane to Head Target | Camera Lens | Film Speed |
|---|---|---|---|---|---|---|---|---|
| 1 | Left side view offboard | 92.0 in | 309.5 in | 54.5 in | N/A | 290.8 in | 10 mm | 24 frames/s |
| 2 | Left side view wide | 79.5 in | 72.8 in | 48.5 in | -3.7° | 53.6 in | 5 mm | 1010 frames/s |
| 3 | Left side view over shoulder | 99.5 in | 51.3 in | 57.5 in | -12.9° | 35.6 in | 8 mm | 1002 frames/s |
| 4 | Right side view wide | 68.5 in | 88.8 in | 48.0 in | -1.8° | 73.0 in | 13 mm | 1002 frames/s |
| 5 | Right side view over shoulder | 102.0 in | 50.0 in | 53.5 in | -10.4° | 36.4 in | 8 mm | 1000 frames/s |
| 6 | Front view - driver | 29.5 in | 15.8 in | 59.5 in | -9.2° | 50.8 in | 8 mm | 1008 frames/s |
| 7 | Front view - passenger | 29.5 in | 18.8 in | 59.5 in | -7.8° | 51.6 in | 8 mm | 1002 frames/s |

[1] +X: Film plane to front of sled
+Y: Film plane to sled centerline
+Z: Film plane to top of sled

[2] +Angle: Film plane of camera upward from horizontal plane

# Appendix A

Photographs

Figure A-1 Pre-Test Front View Of Test Vehicle Mounted To Sled

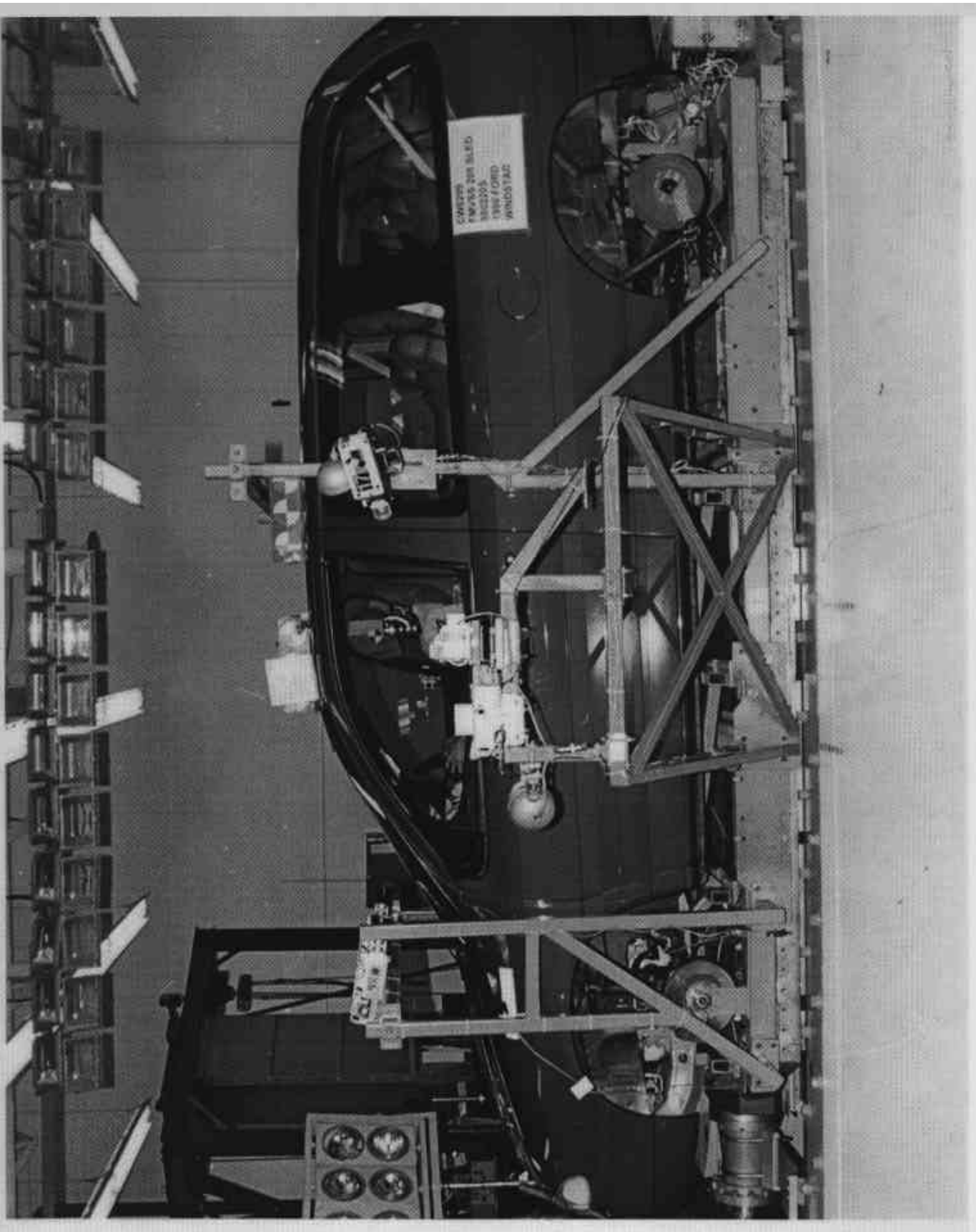


Figure A-2 Pre-Test Left Side View Of Test Vehicle Mounted To Sled

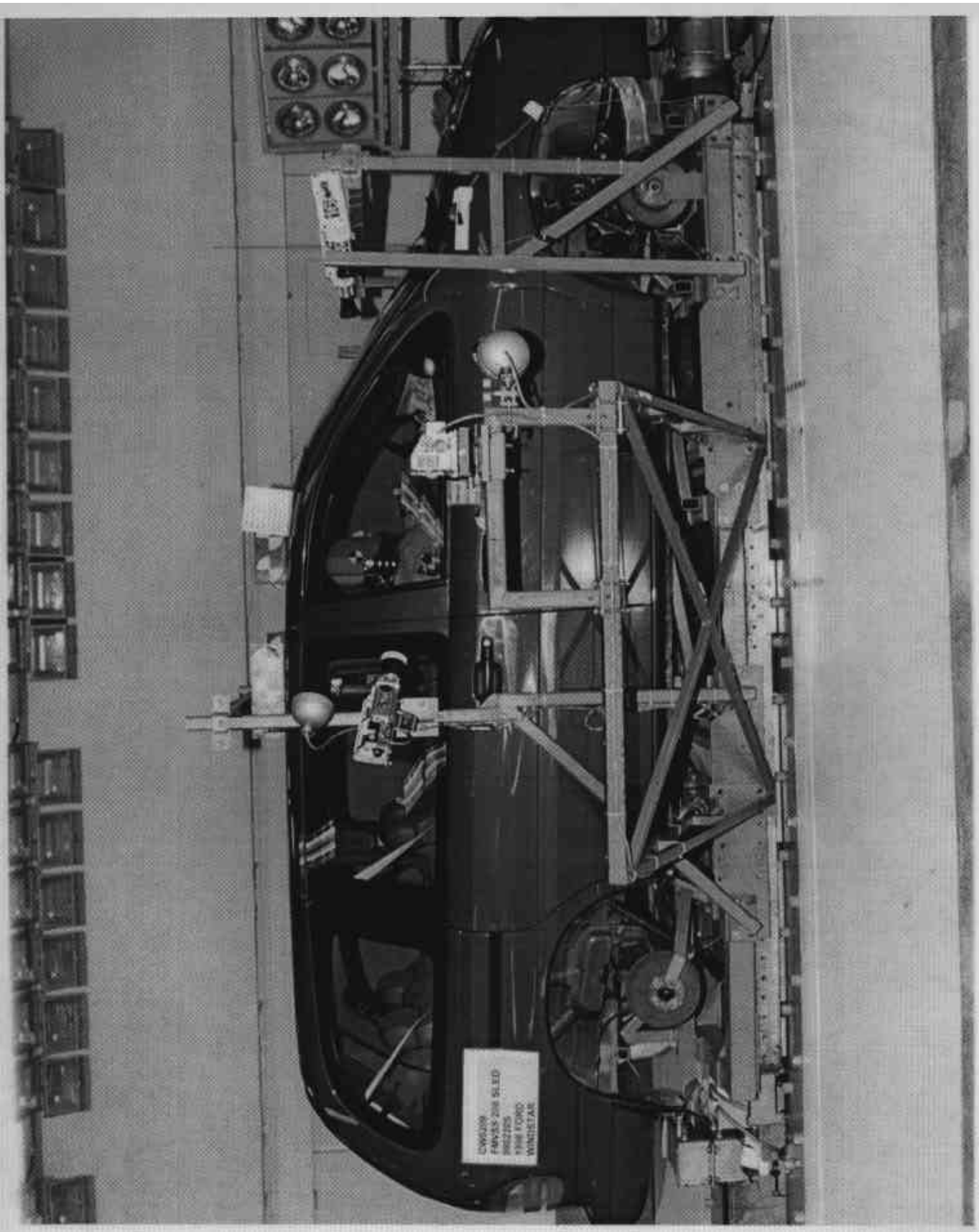


Figure A-3 Pre-Test Right Side View Of Test Vehicle Mounted To Sled

Figure A-4 Post-Test Windshield View


Figure A-5 Pre-Test Driver Dummy Position View With Door Open

Figure A-6 Post-Test Driver Dummy Position View With Door Open - View 1


Figure A-7 Post-Test Driver Dummy Position View With Door Open - View 2

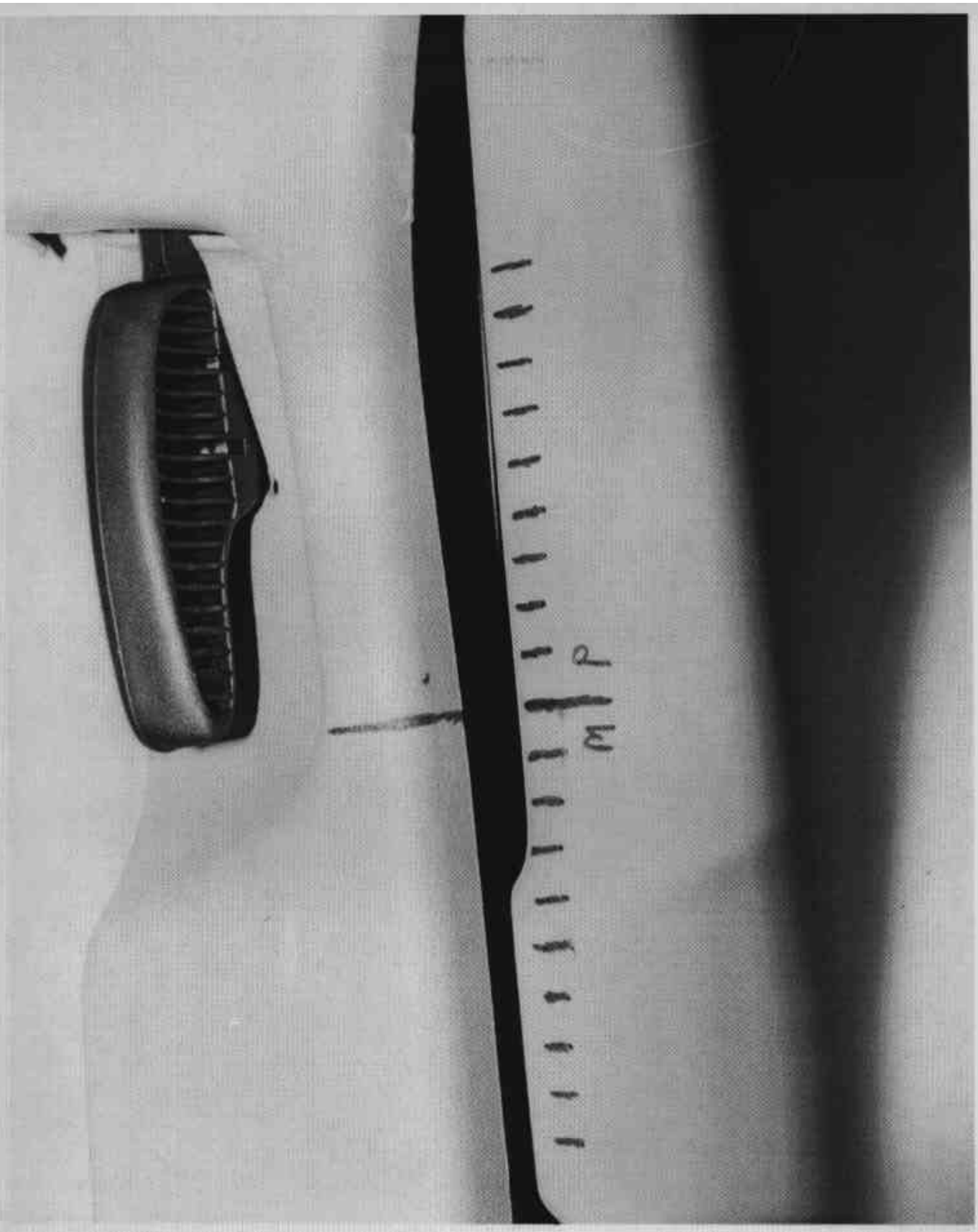



Figure A-8 Pre-Test Driver Seat Track Position View

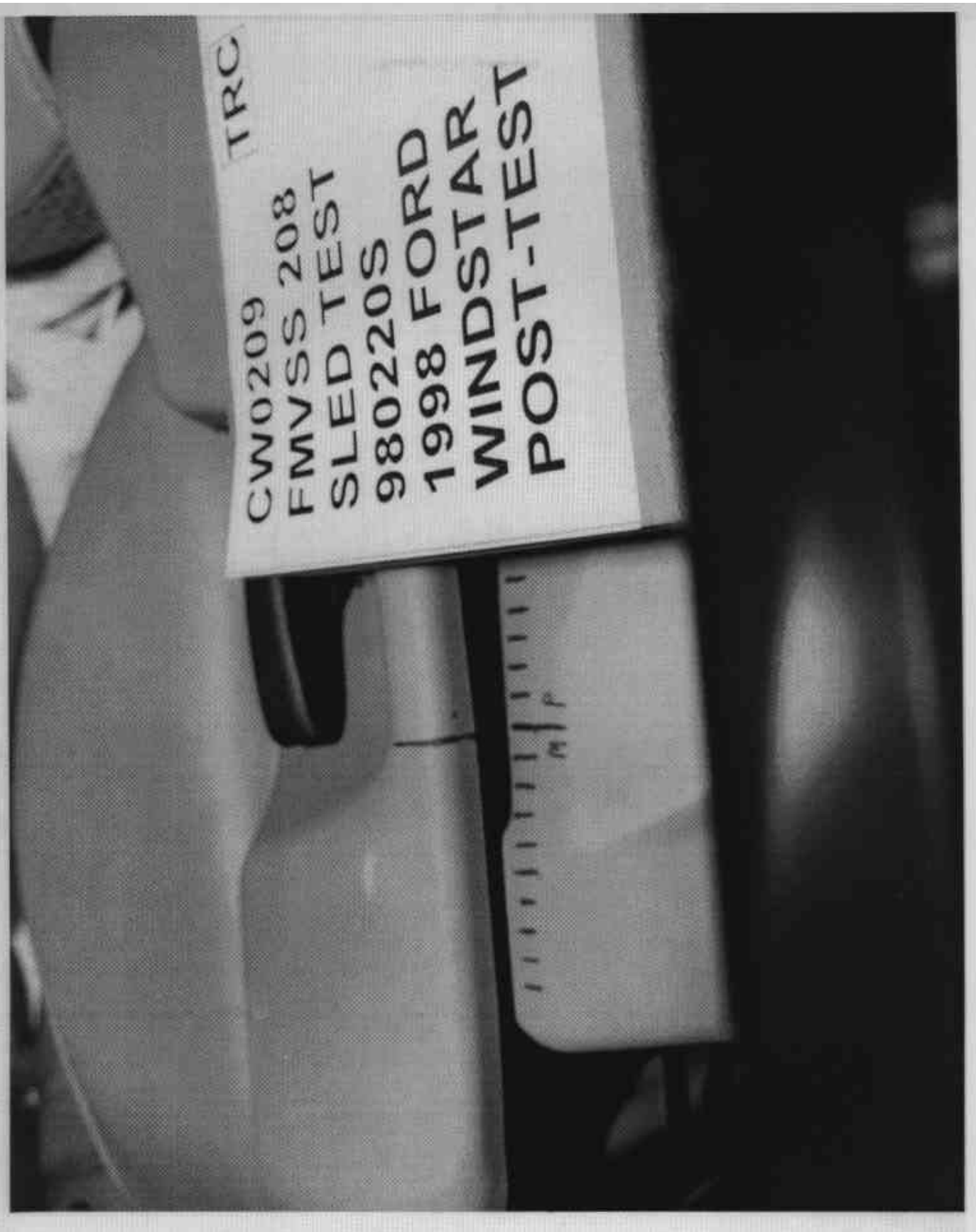



Figure A-9 Post-Test Driver Seat Track Position View


Figure A-10 Pre-Test Driver Dummy Position View With Door Closed


Figure A-11 Post-Test Driver Knee Bolster View

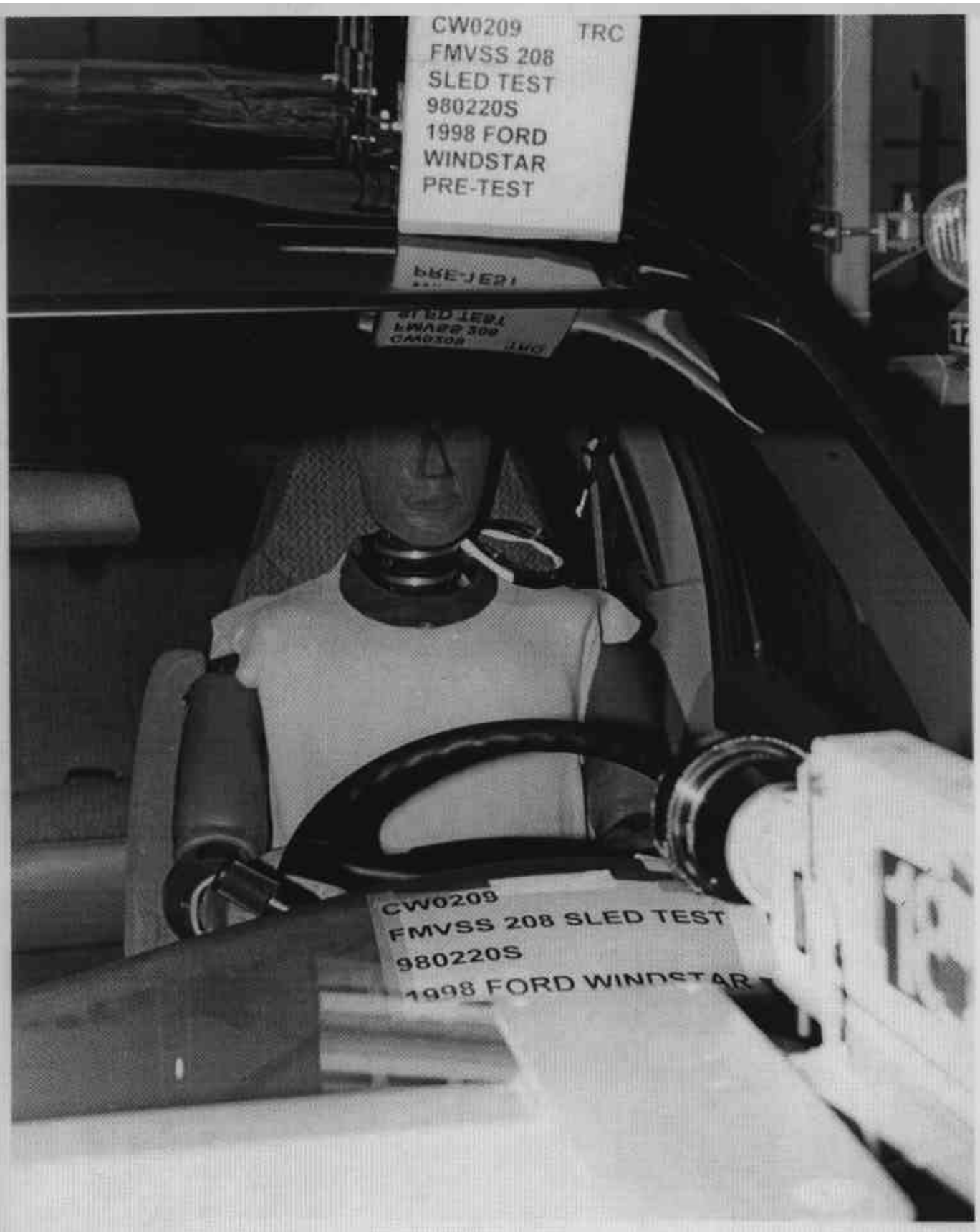



Figure A-12 Pre-Test Driver Dummy Position Front View

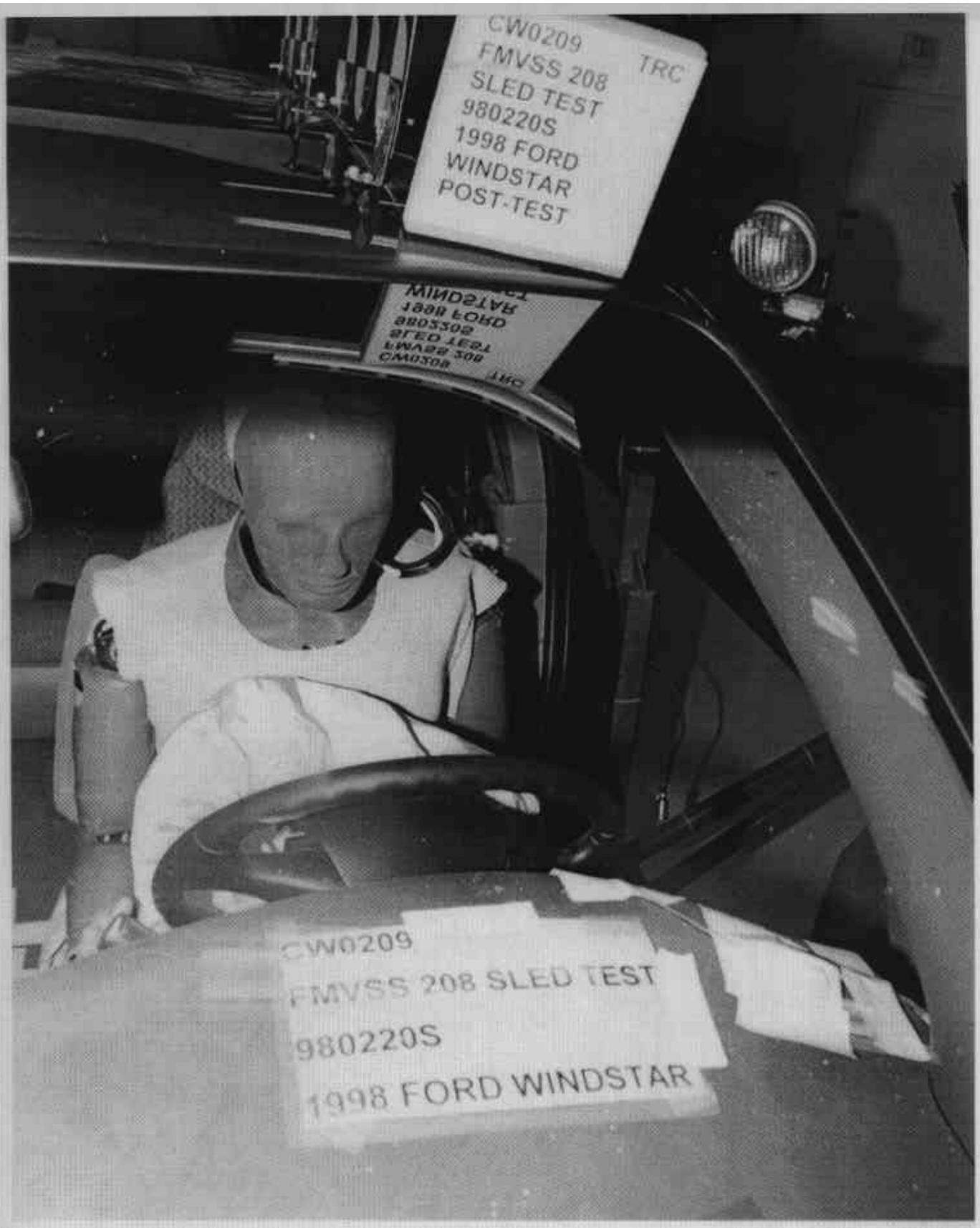



Figure A-13 Post-Test Driver Dummy Position Front View


Figure A-14 Post-Test Driver Airbag View

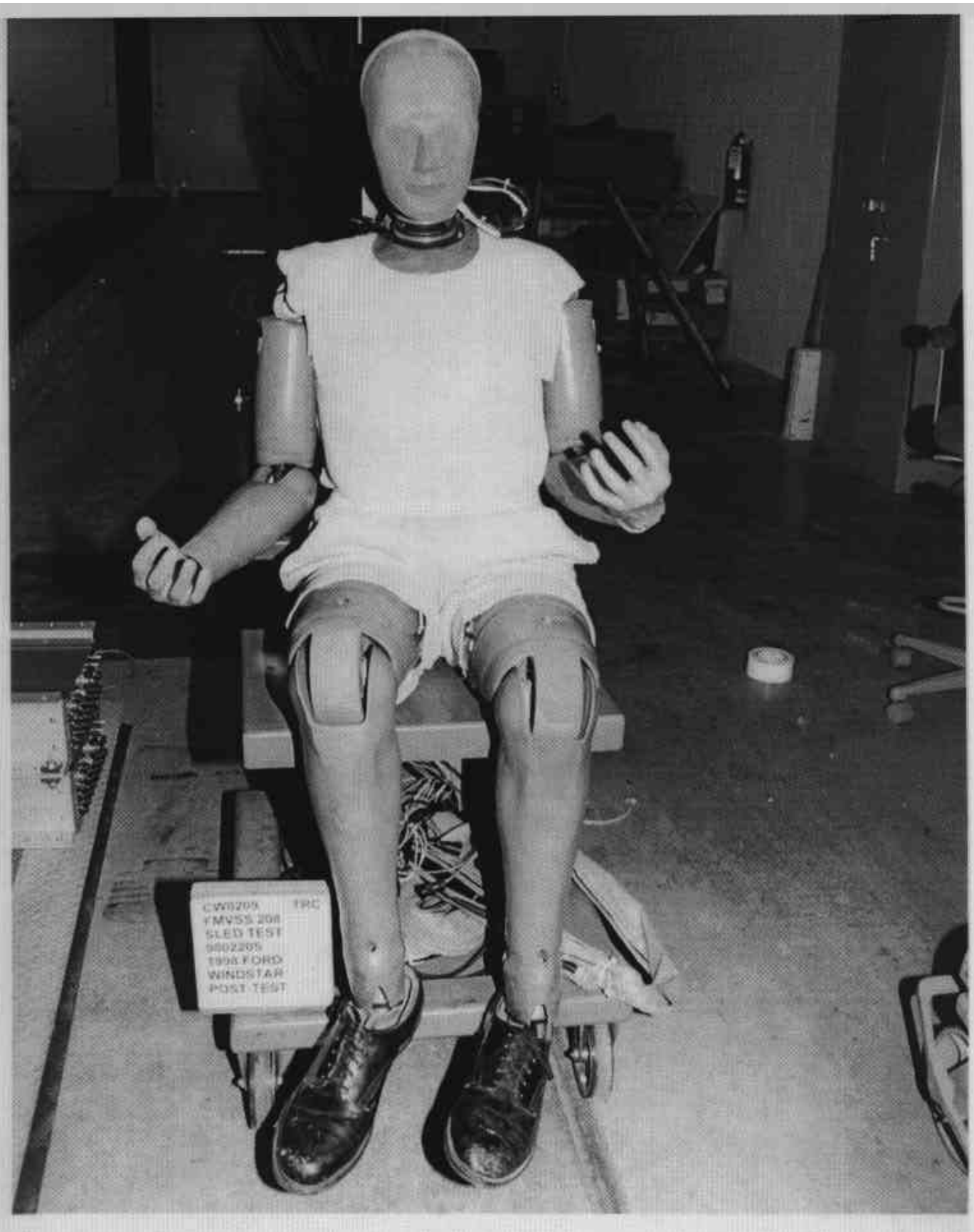



Figure A-15 Post-Test Driver Dummy Removed From Vehicle Overall View

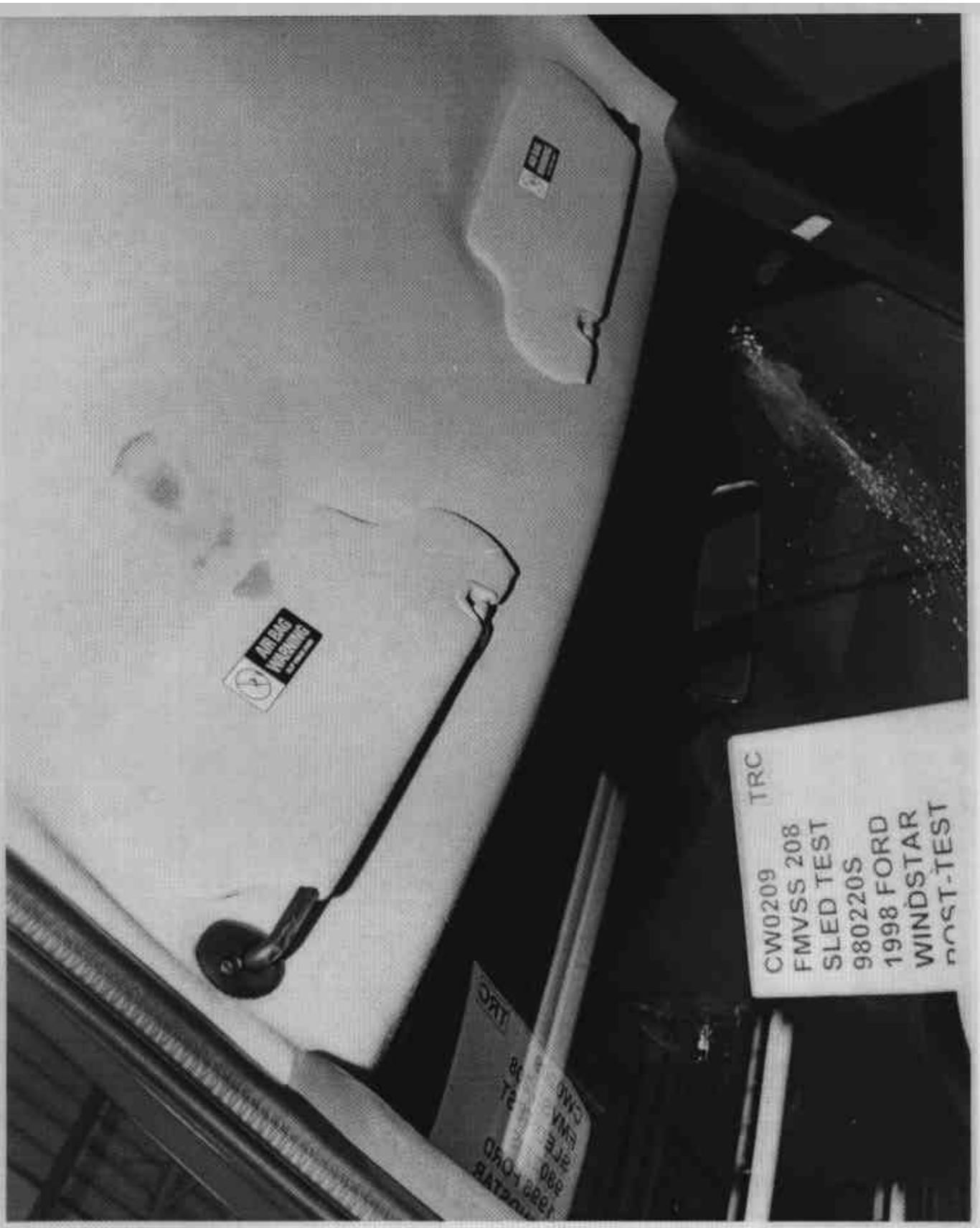



Figure A-16 Post-Test Driver Head Contact View

Fig. A-17 Pre-Test Passenger Dummy Position View With Door Open - View 1

Fig. A-18 Pre-Test Passenger Dummy Position View With Door Open - View 2


Figure A-19 Post-Test Passenger Dummy Position View With Door Open - View 1

Figure A-20 Post-Test Passenger Dummy Position View With Door Open - View 2

Figure A-21 Pre-Test Passenger Seat Track Position View

Figure A-22 Post-Test Passenger Seat Track Position View

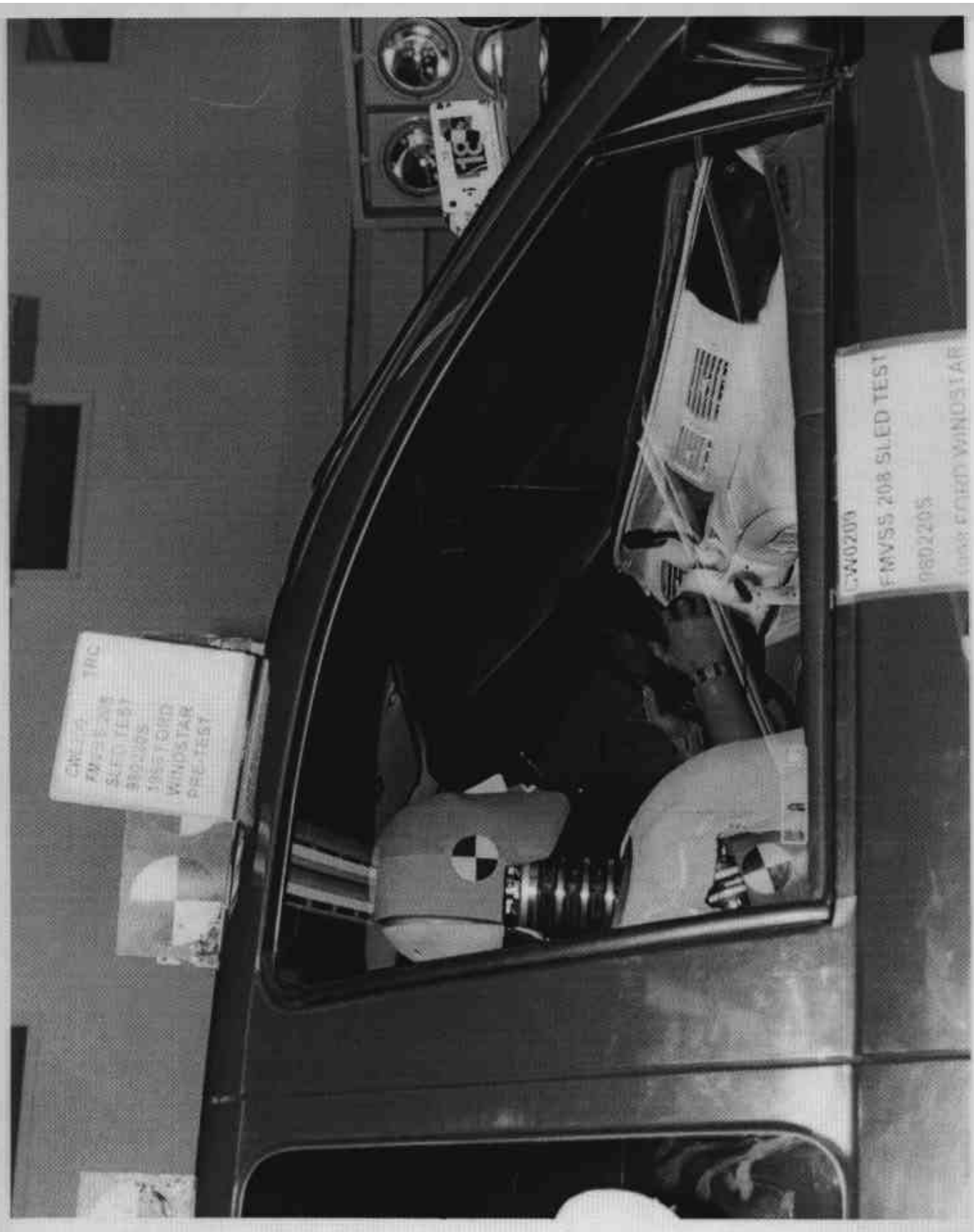



Figure A-23 Pre-Test Passenger Dummy Position View With Door Closed

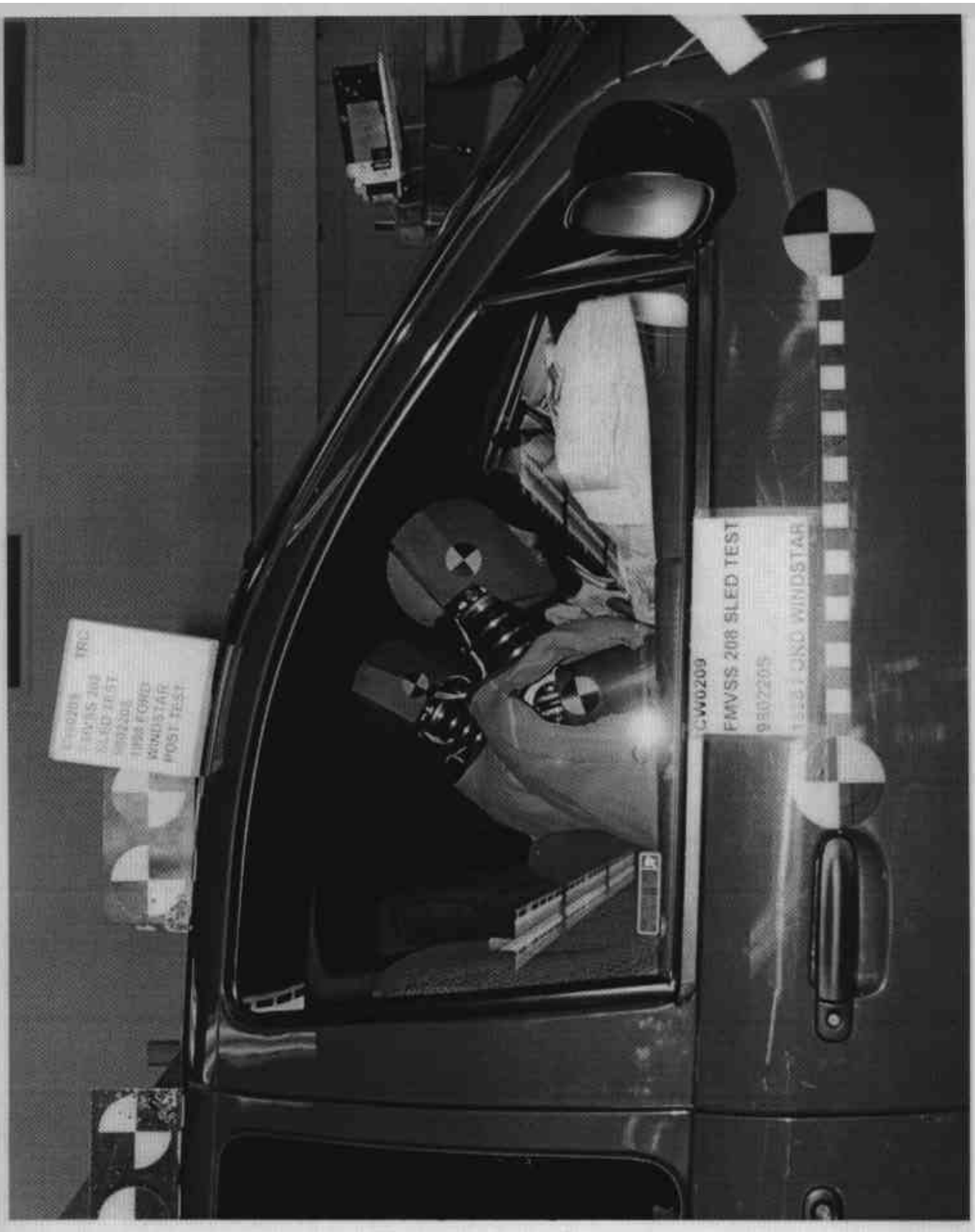



Figure A-24 Post-Test Passenger Dummy Position View With Door Closed


Figure A-25 Post-Test Passenger Glove Box View

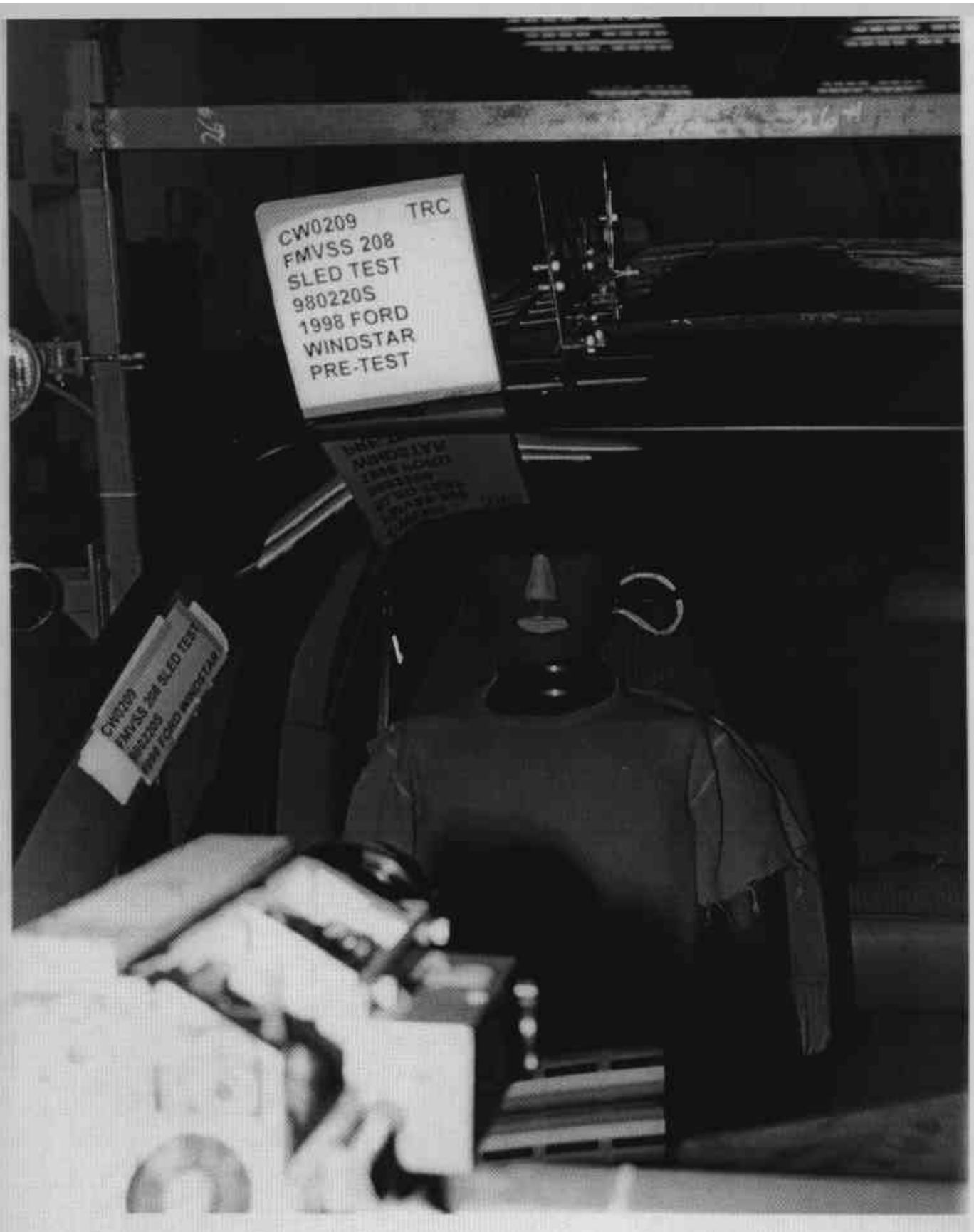



Figure A-26 Pre-Test Passenger Dummy Position Front View


Figure A-27 Post-Test Passenger Dummy Position Front View

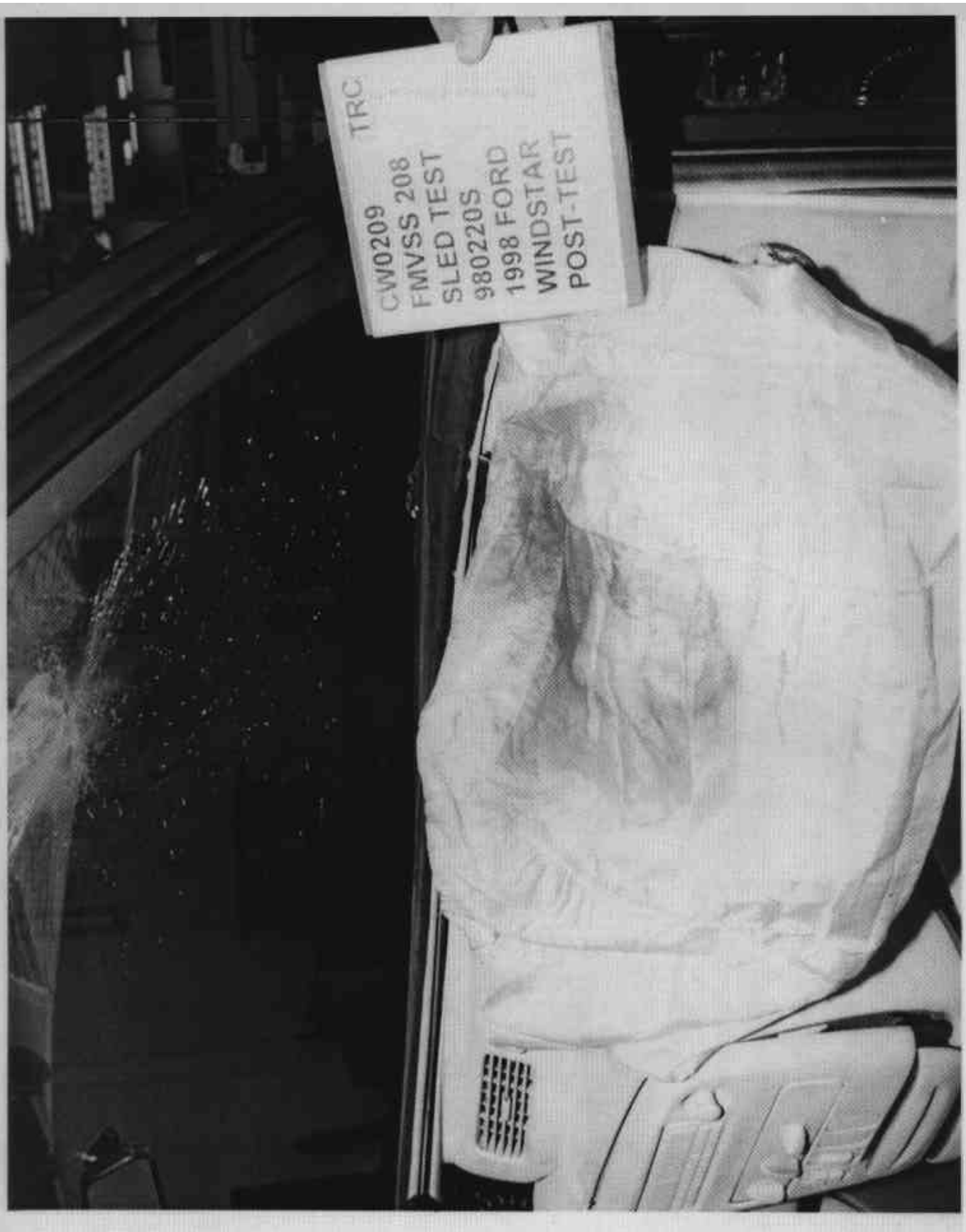



Figure A-28 Post-Test Passenger Airbag View


Figure A-29 Post-Test Passenger Dummy Removed From Vehicle Overall View

Figure A-30 Post-Test Passenger Head Contact View

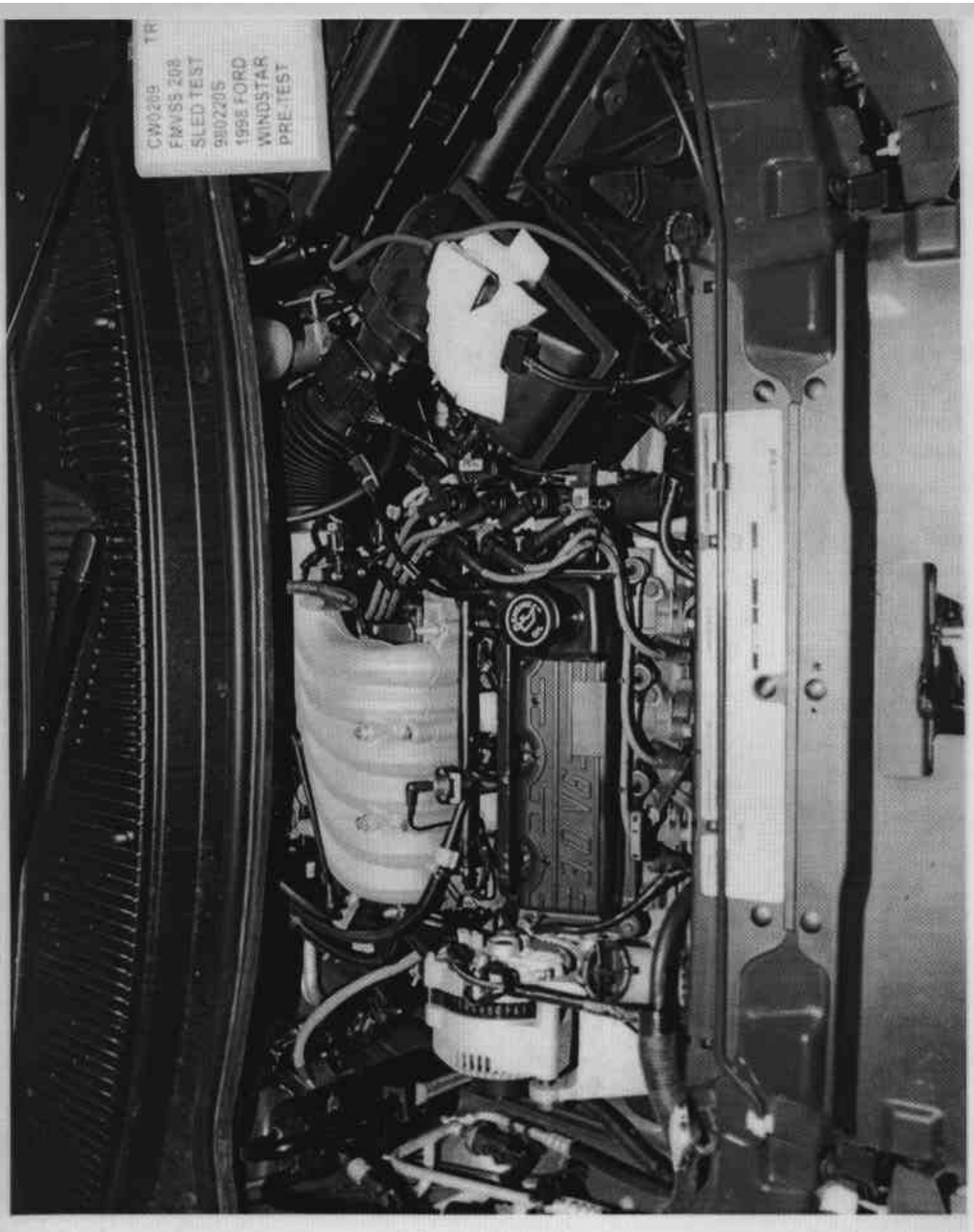



Figure A-31 Pre-Test Steering Column Linkage In Engine Compartment View

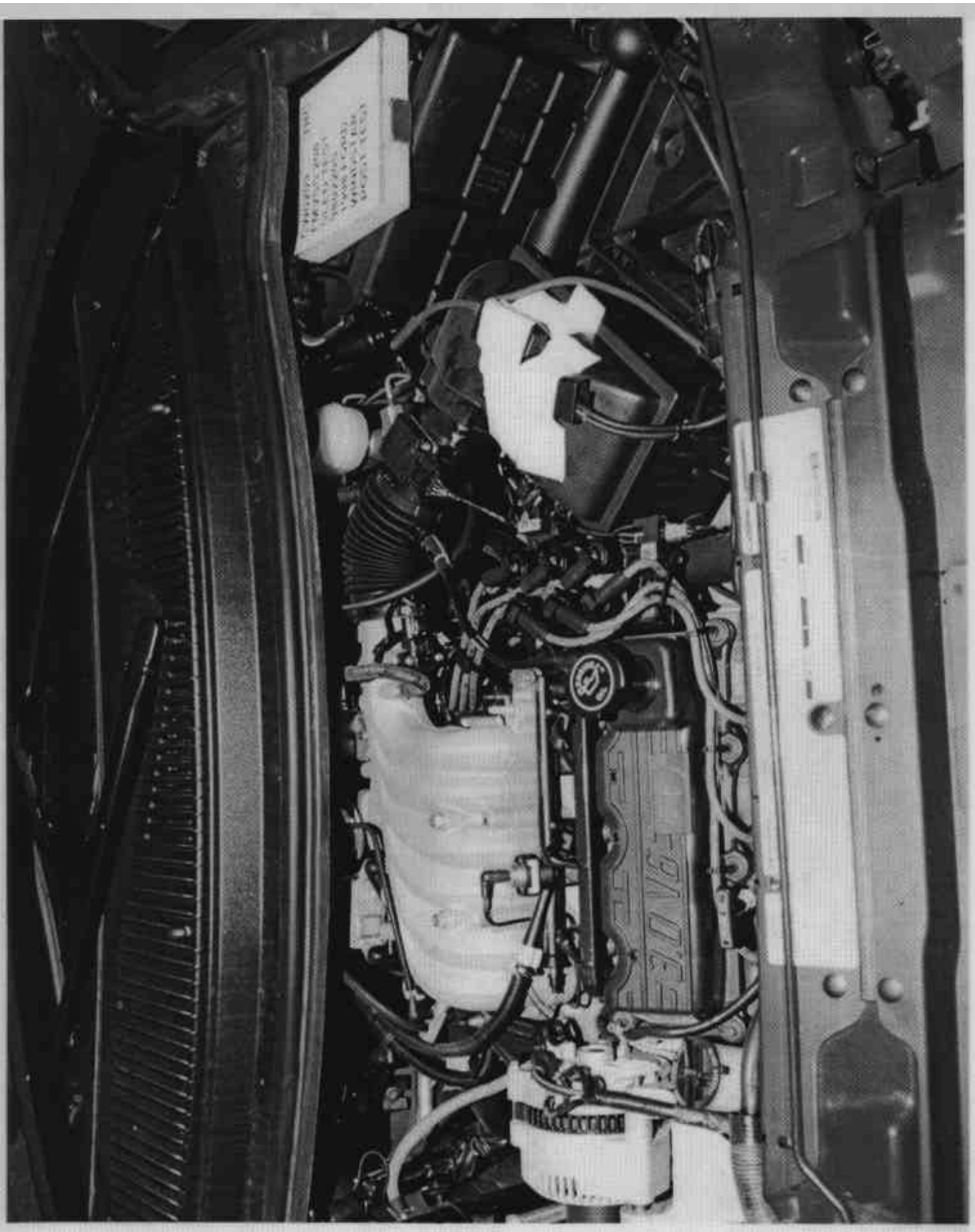



Figure A-32 Post-Test Steering Column Linkage In Engine Compartment View

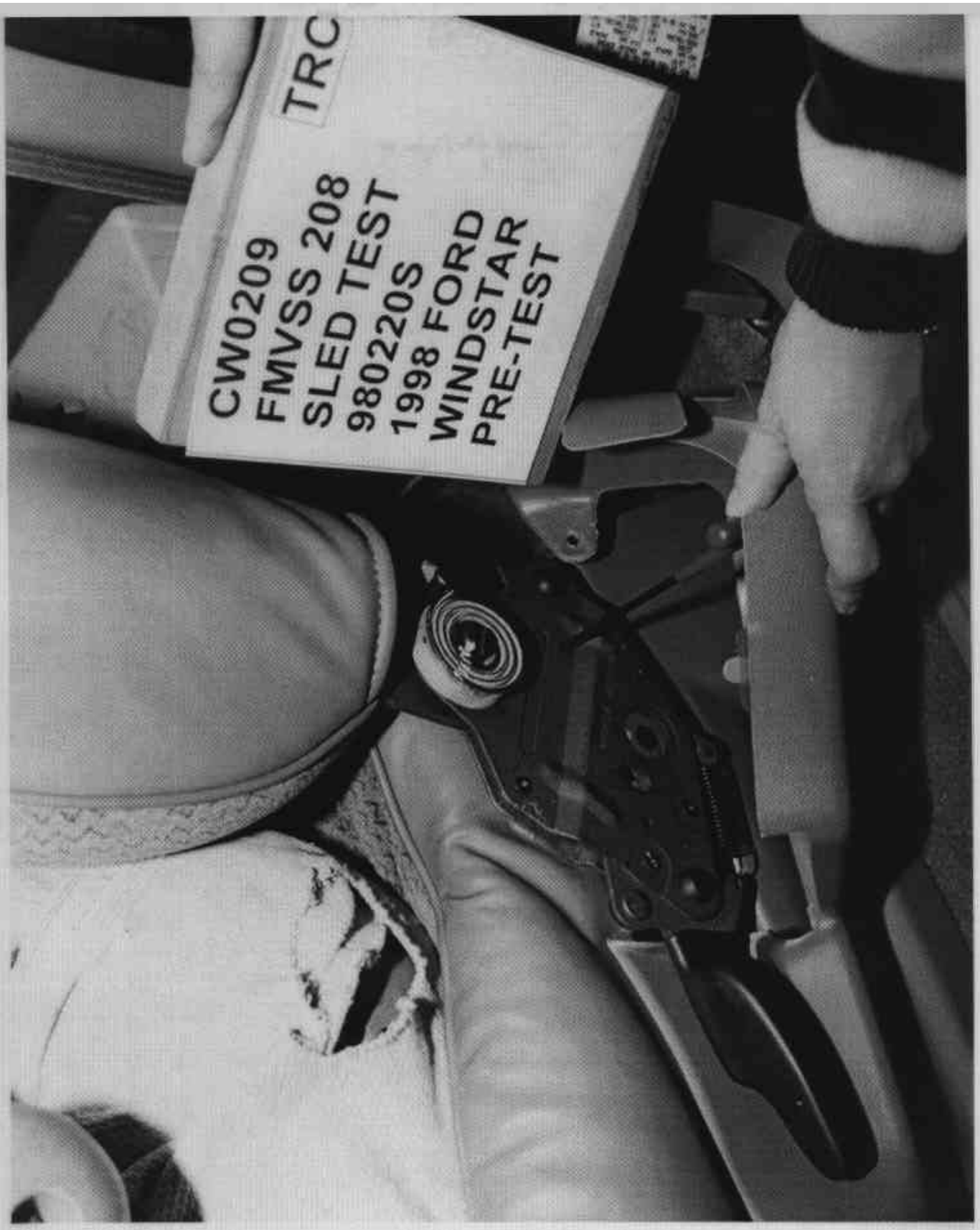



Figure A-33 Pre-Test Seat Angle Alignment Procedure


Figure A-34 Pre-Test Vehicle Certification Label View

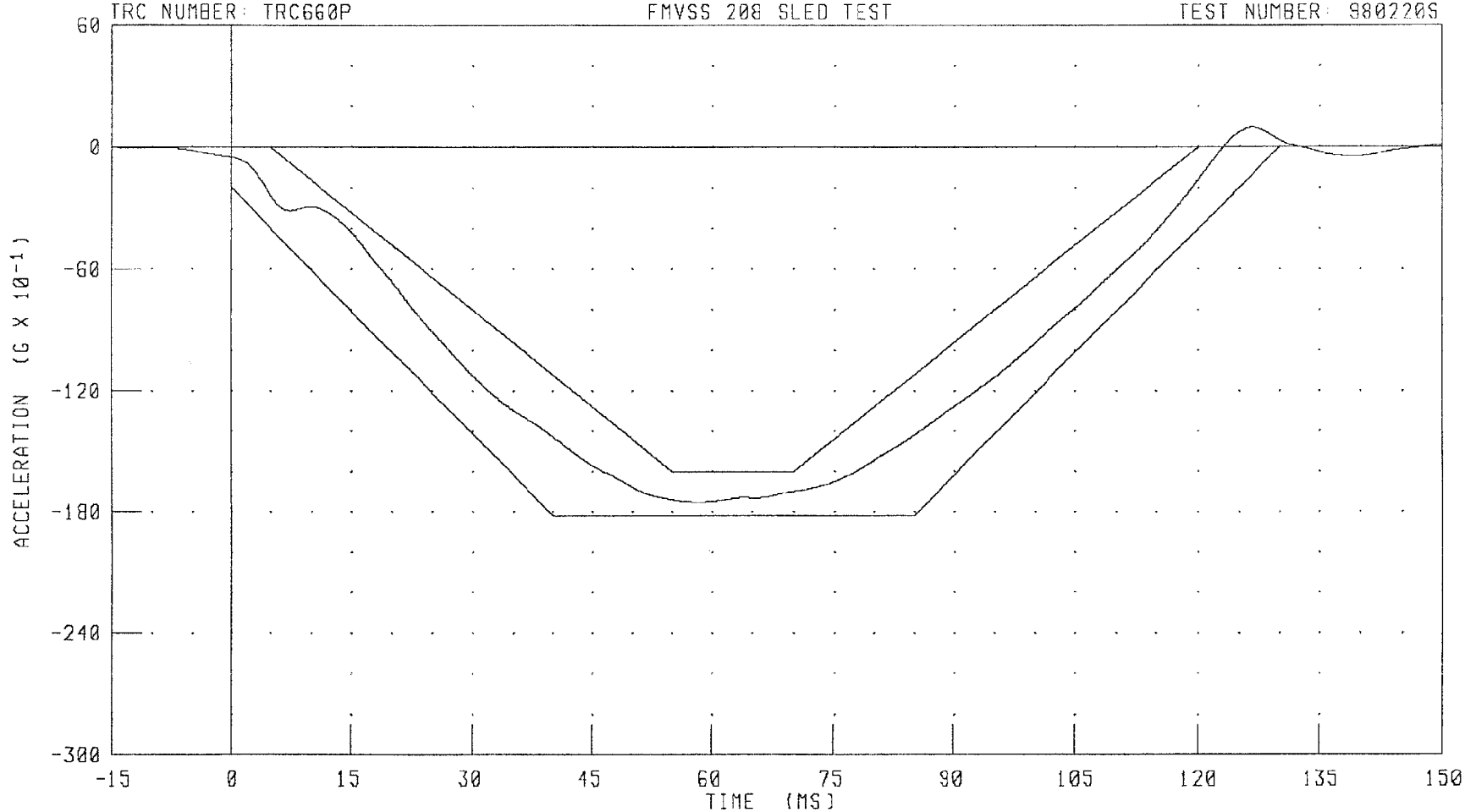
# Appendix B

Data Plots

CW0209 / 1998 FORD WINDSTAR
SLED ACCELERATION
FMVSS 208 SLED TEST

TRC NUMBER: TRC660P

TEST NUMBER: 980220S

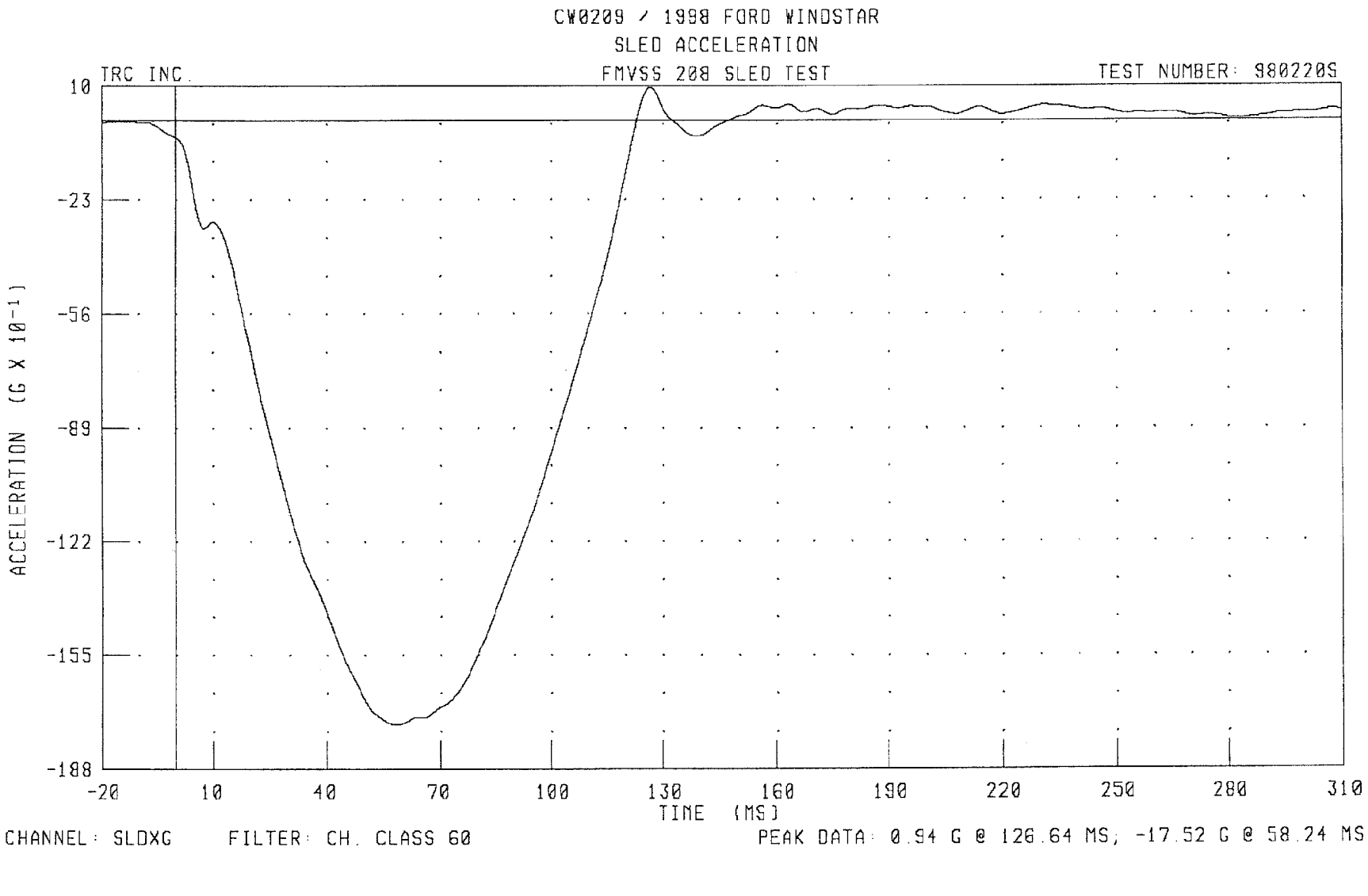



CHANNEL: SLDXG FILTER: CH. CLASS 60

PEAK DATA: 0.94 G @ 126.64 MS; -17.52 G @ 58.24 MS

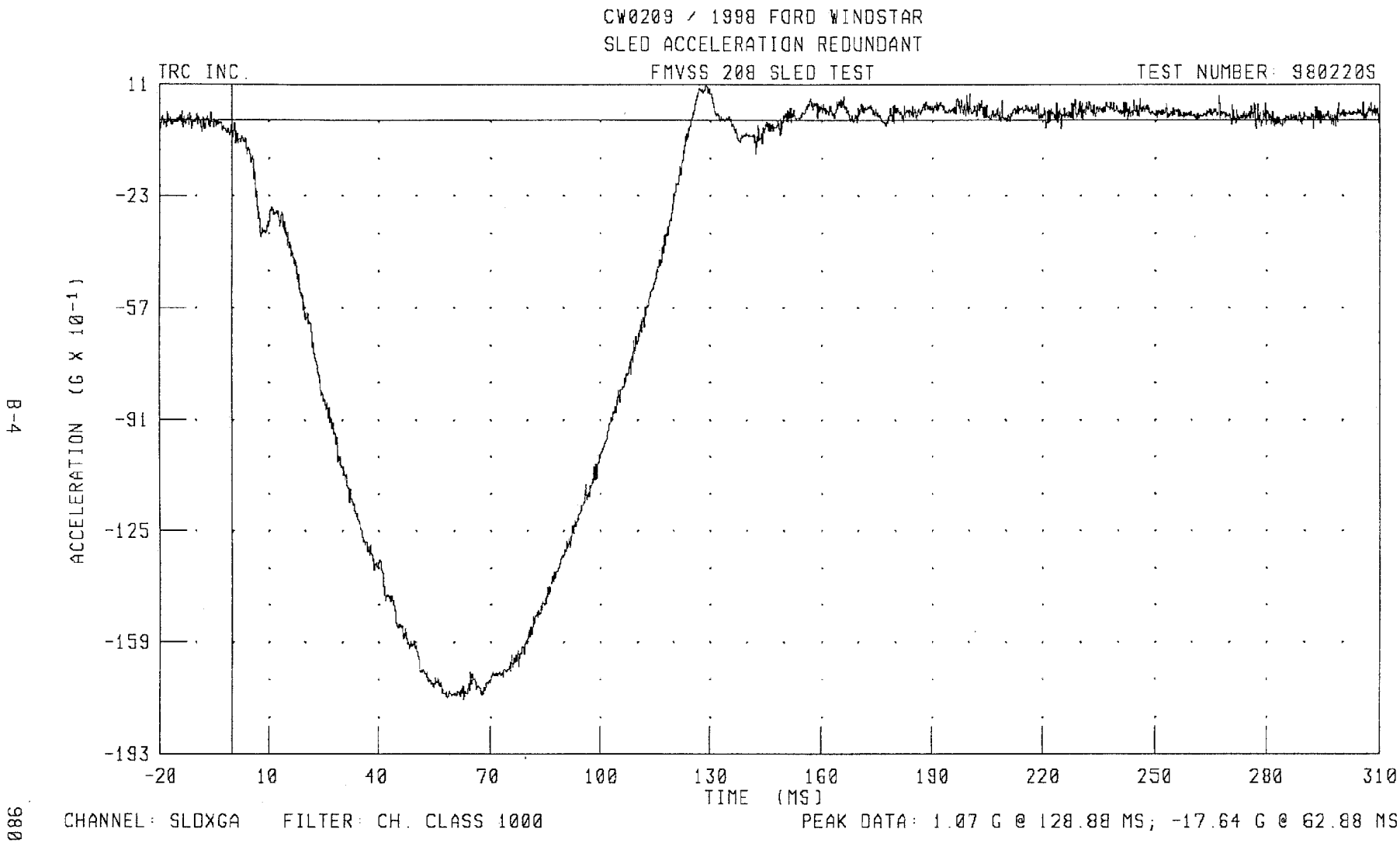


980220


CW0209 / 1998 FORD WINDSTAR
SLED ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
10
-23
-56
-89
-122
-155
-188
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SLDXG
FILTER: CH. CLASS 60
PEAK DATA: 0.94 G @ 126.64 MS, -17.52 G @ 58.24 MS



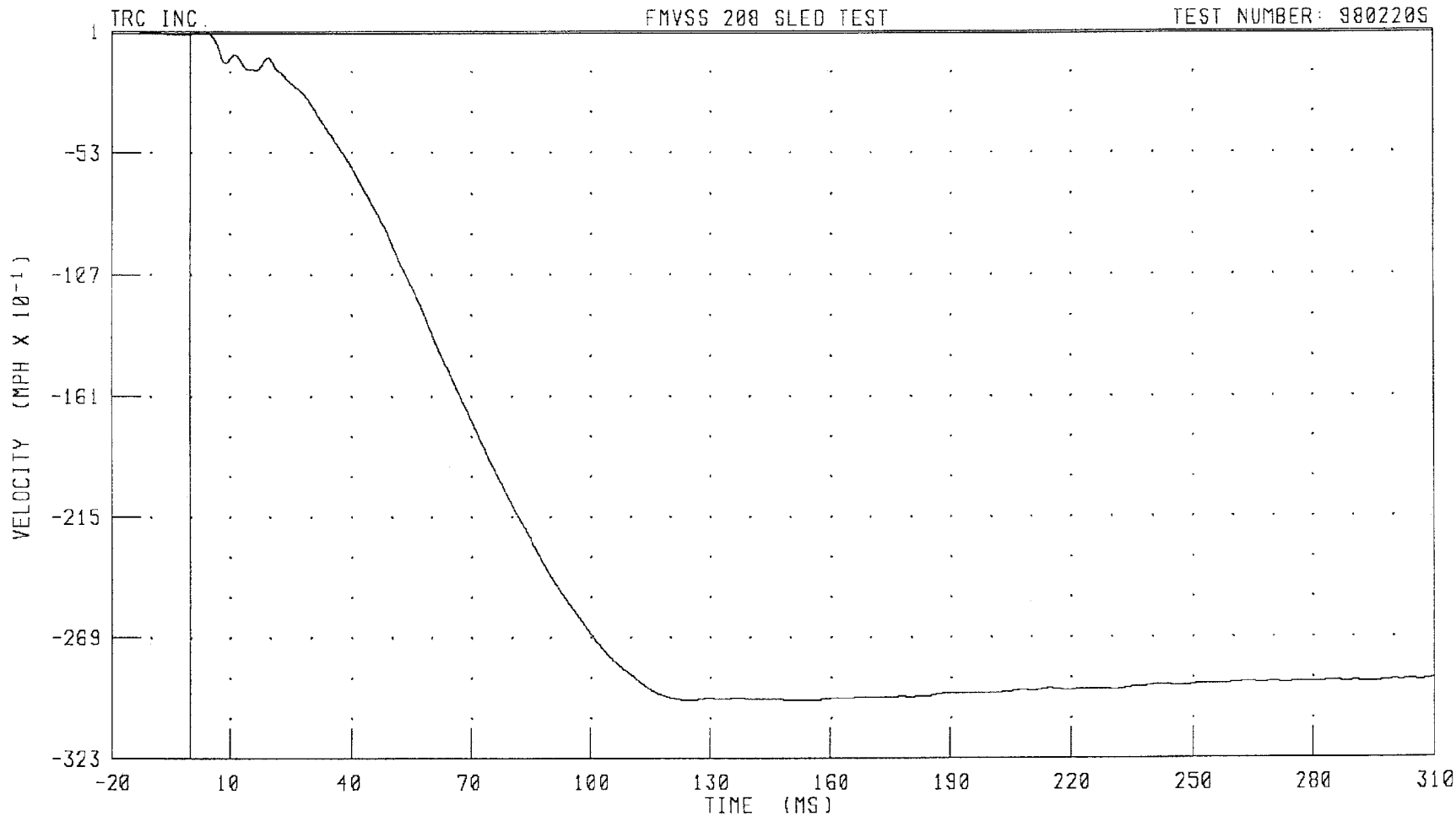
980220


CW0209 / 1998 FORD WINDSTAR
SLED ACCELERATION REDUNDANT
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
11
-23
-57
-91
-125
-159
-193
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SLDXGA
FILTER: CH. CLASS 1000
PEAK DATA: 1.07 G @ 128.88 MS; -17.64 G @ 62.88 MS



980220

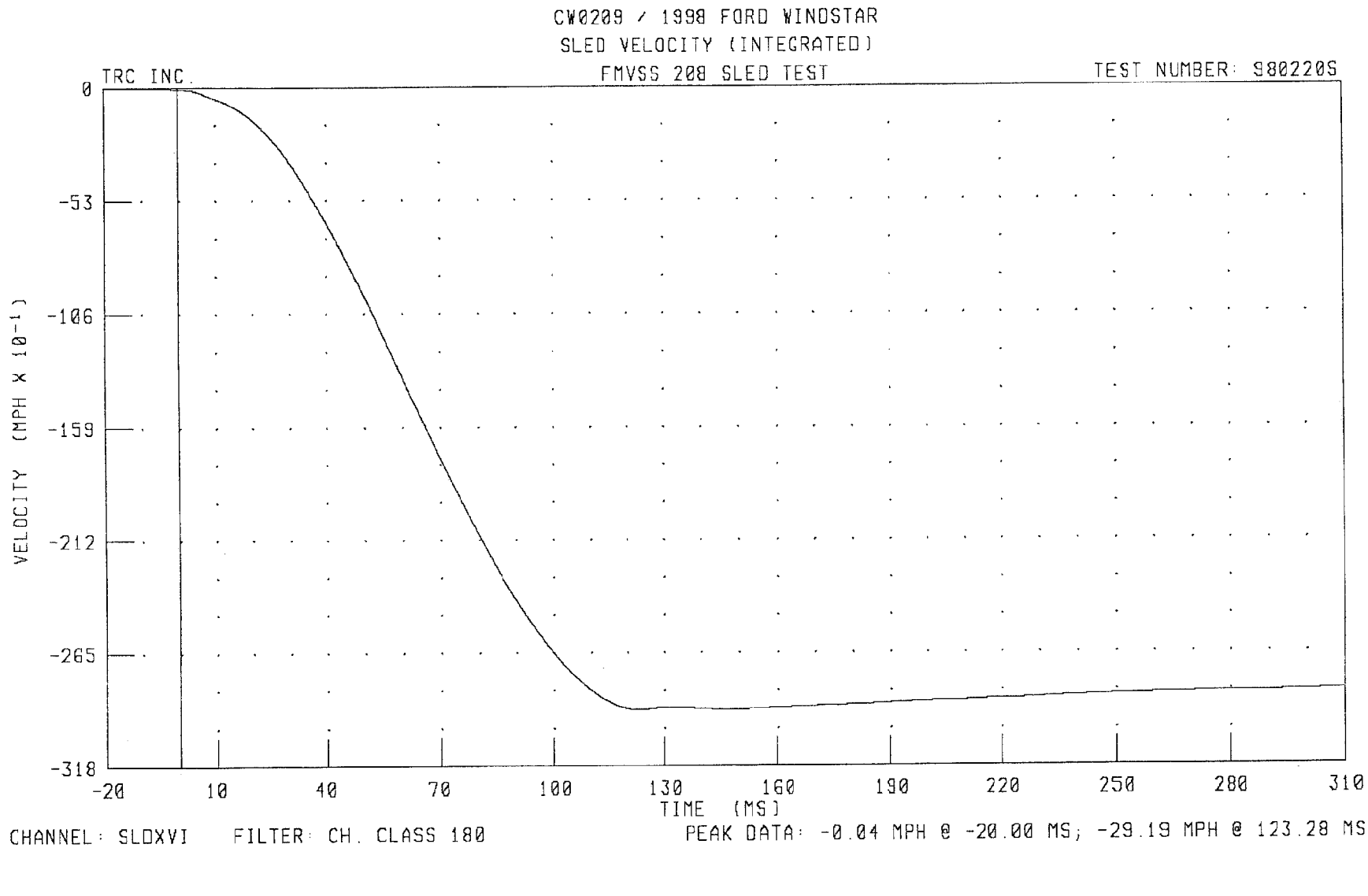
CW0209 / 1998 FORD WINDSTAR
MEASURED VELOCITY TRAP




CHANNEL: SLDXV FILTER: CH. CLASS 60 PEAK DATA: 0.10 MPH @ 3.12 MS; -29.74 MPH @ 155.76 MS

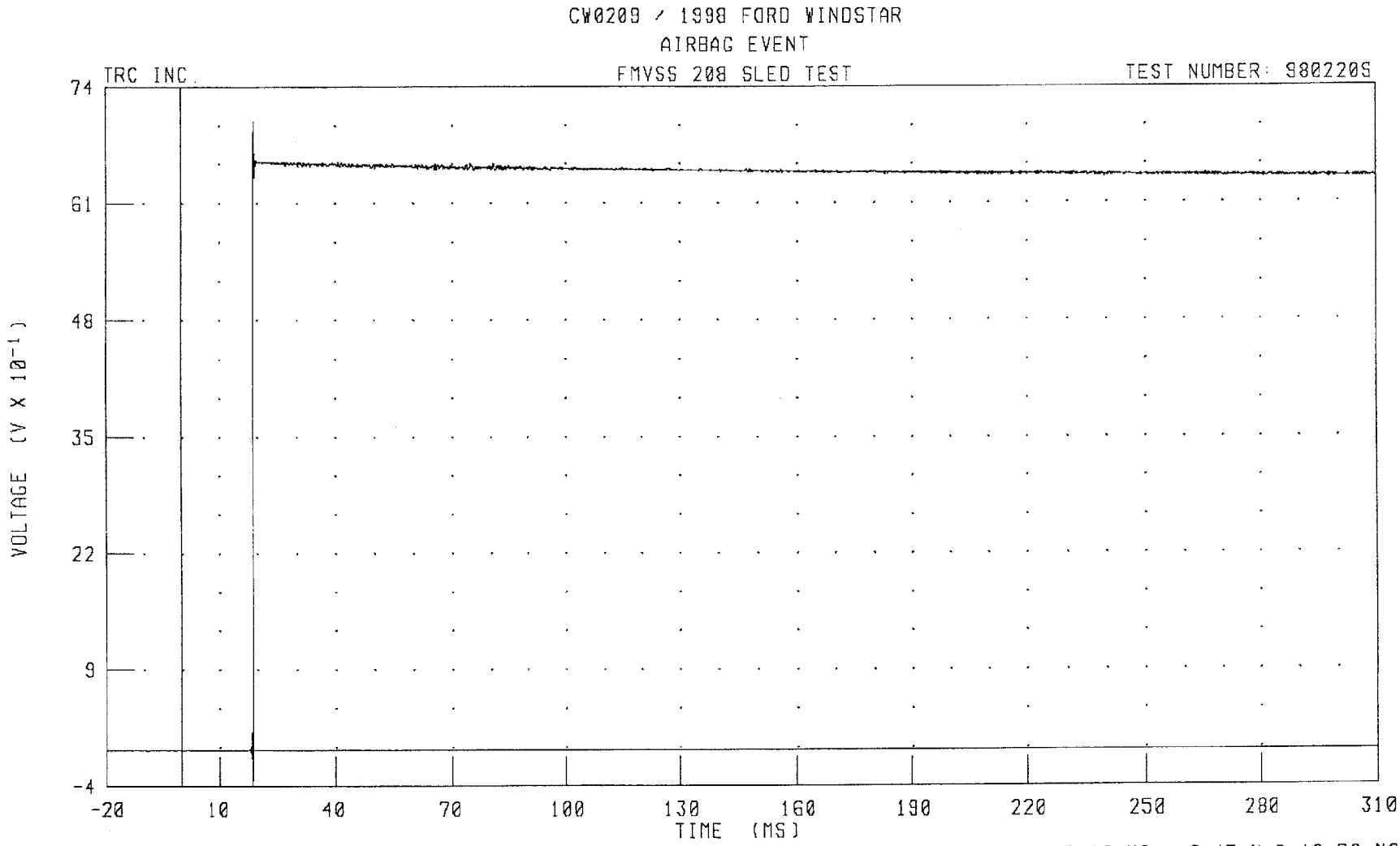


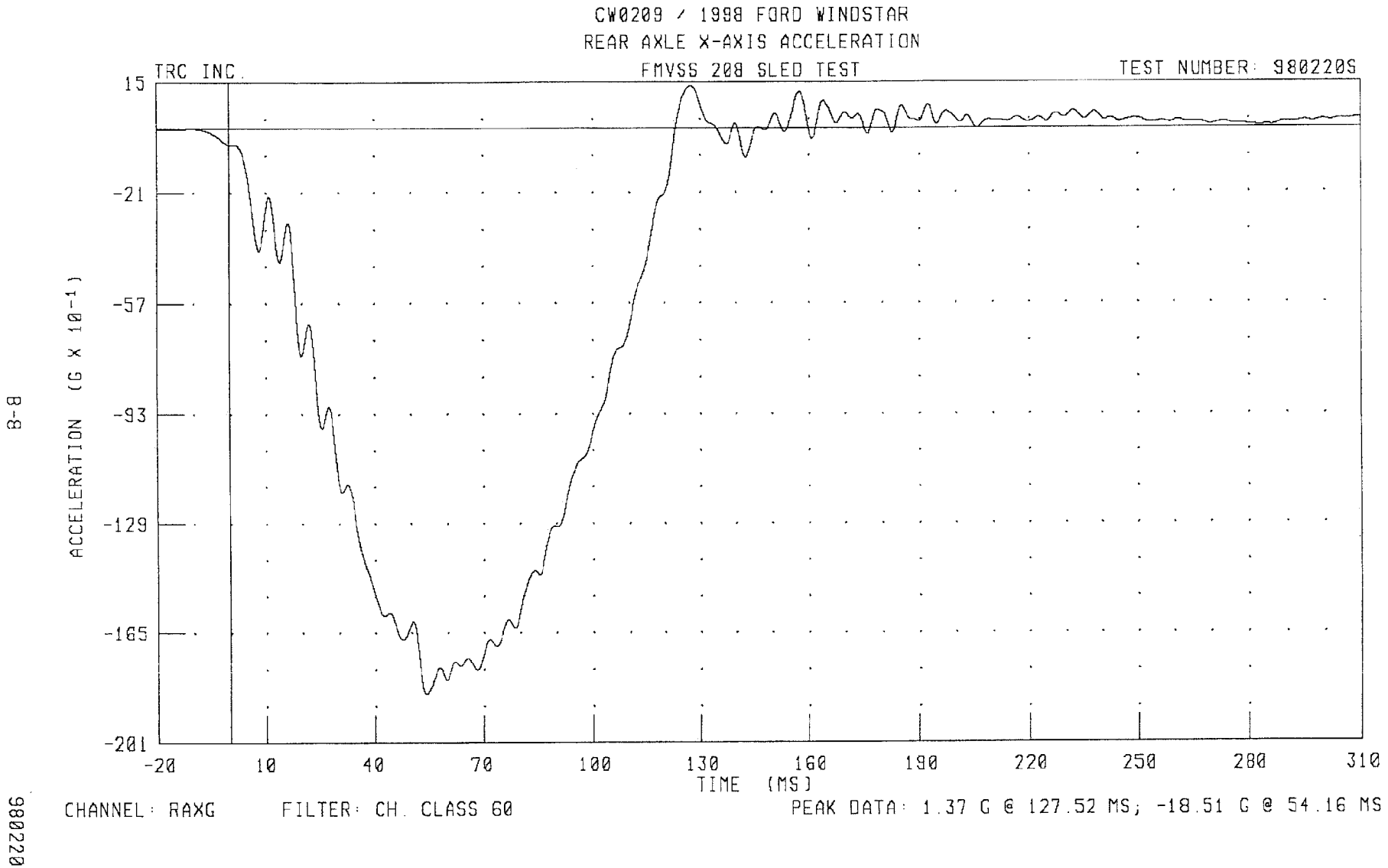
980220


CW0209 / 1998 FORD WINDSTAR
SLED VELOCITY (INTEGRATED)
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
VELOCITY (MPH X 10-1)
0
-53
-106
-159
-212
-265
-318
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: SLDXVI
FILTER: CH. CLASS 180
PEAK DATA: -0.04 MPH @ -20.00 MS; -29.19 MPH @ 123.28 MS



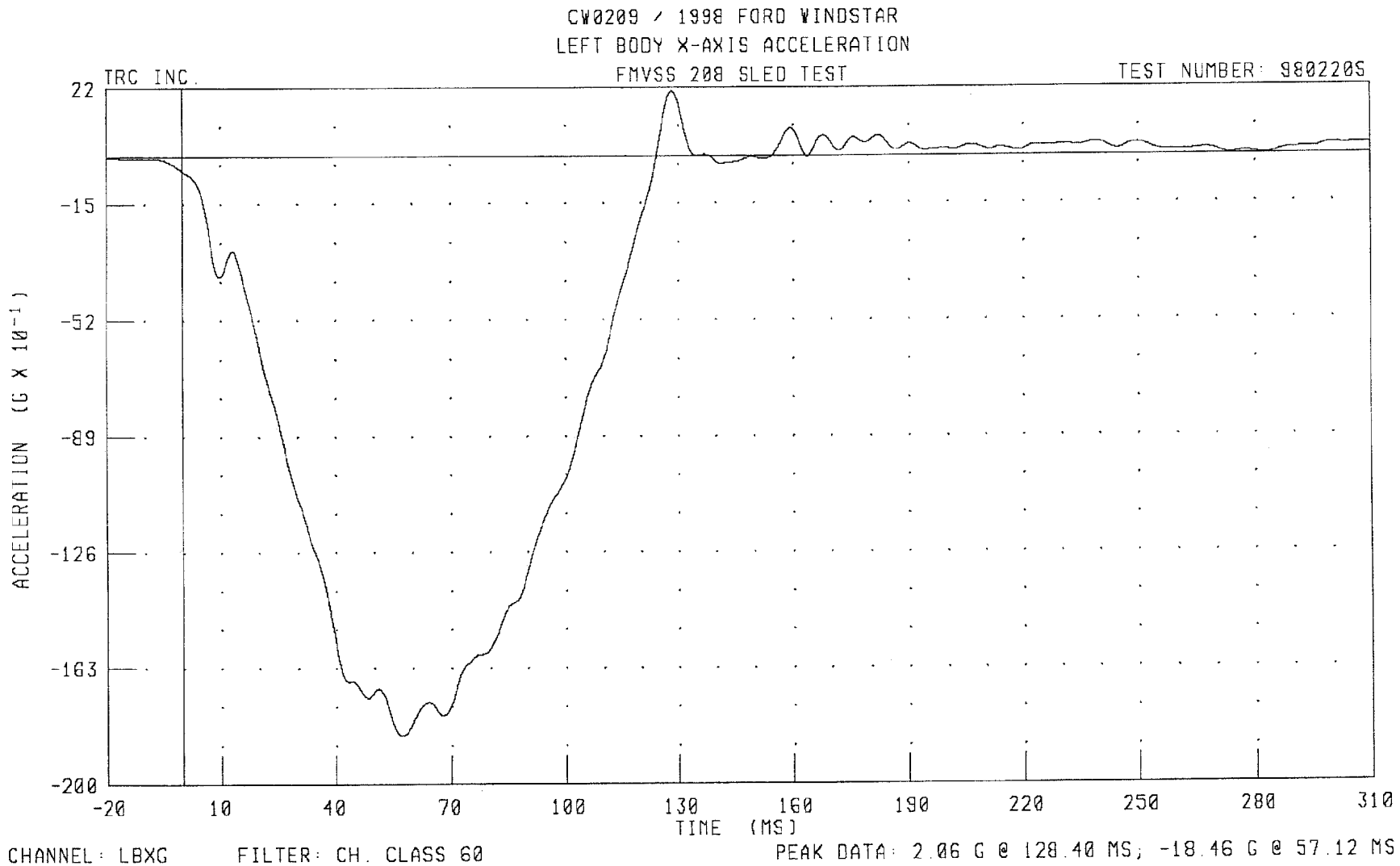
980220


CW0209 / 1998 FORD WINDSTAR
AIRBAG EVENT
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
74
61
48
35
22
9
-4
VOLTAGE (V X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: ABEVT
FILTER: CH. CLASS 1000
PEAK DATA: 7.01 V @ 19.12 MS; -0.45 V @ 18.72 MS


CW0209 / 1998 FORD WINDSTAR
REAR AXLE X-AXIS ACCELERATION
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
15
-21
-57
-93
-129
-165
-201
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RAXG
FILTER: CH. CLASS 60
PEAK DATA: 1.37 G @ 127.52 MS; -18.51 G @ 54.16 MS

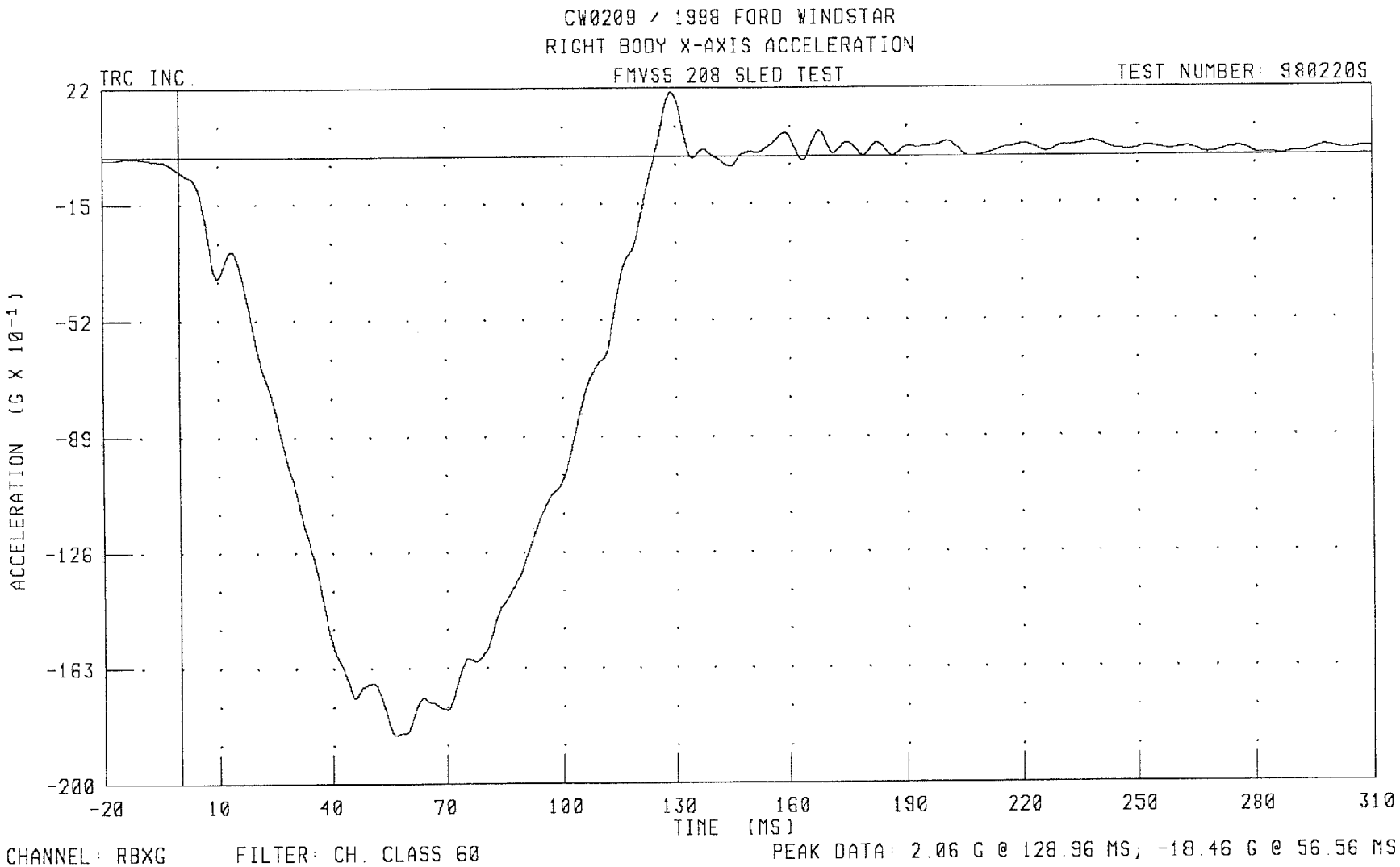


980220


CW0209 / 1998 FORD WINDSTAR
LEFT BODY X-AXIS ACCELERATION
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
22
-15
-52
-89
-126
-163
-200
ACCELERATION (G X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LBXG
FILTER: CH. CLASS 60
PEAK DATA: 2.06 G @ 128.40 MS; -18.46 G @ 57.12 MS

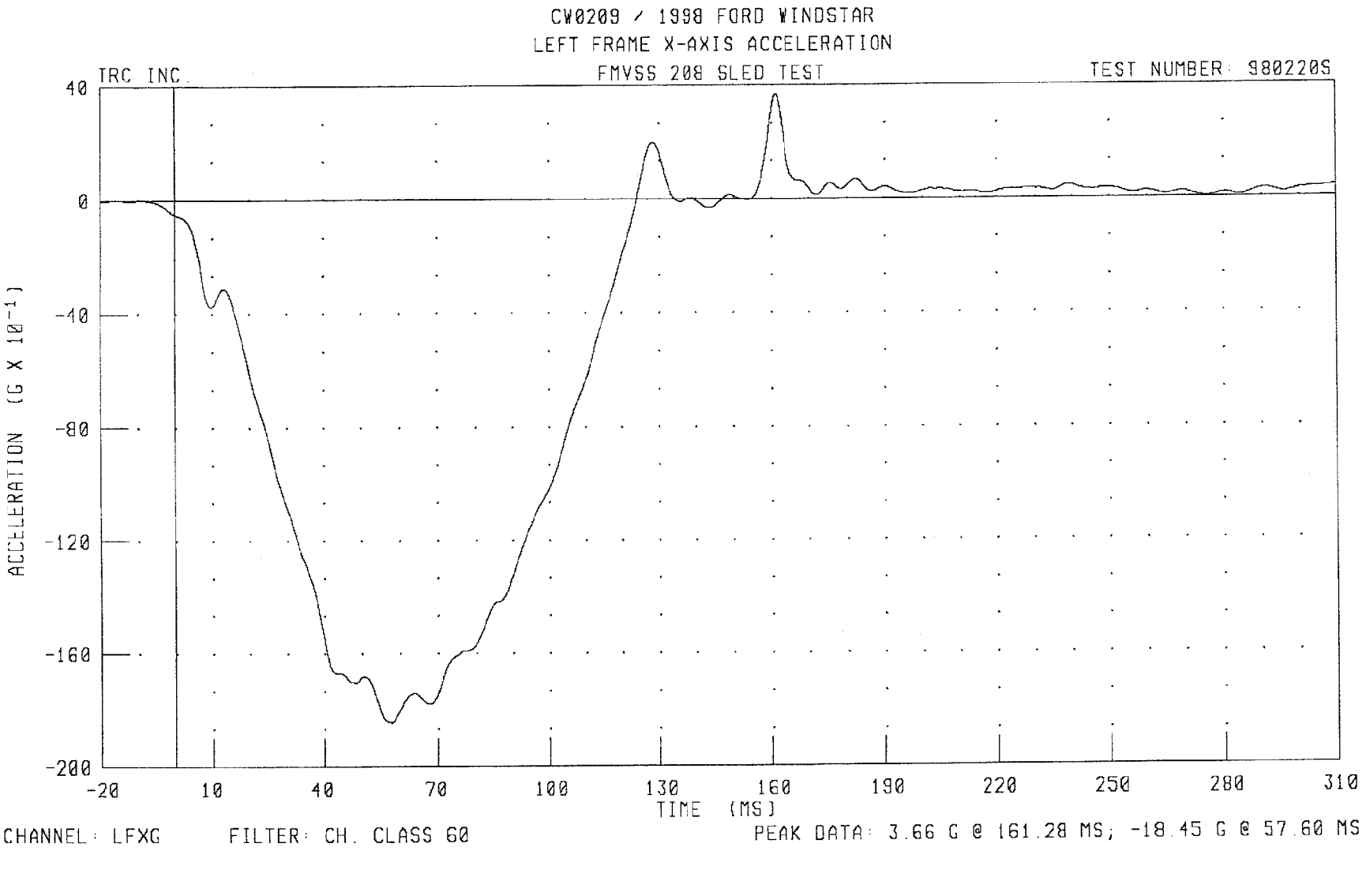


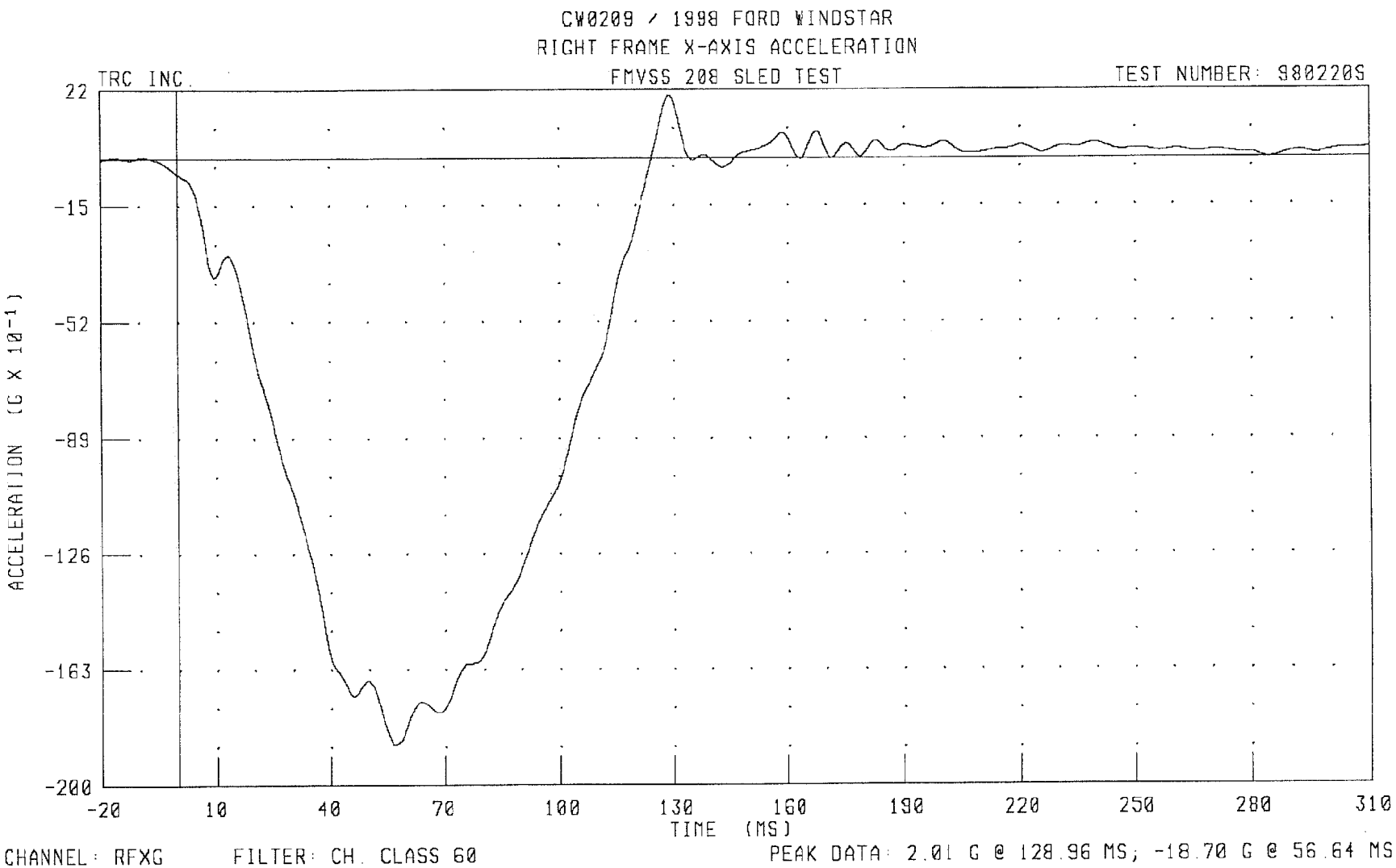
980220

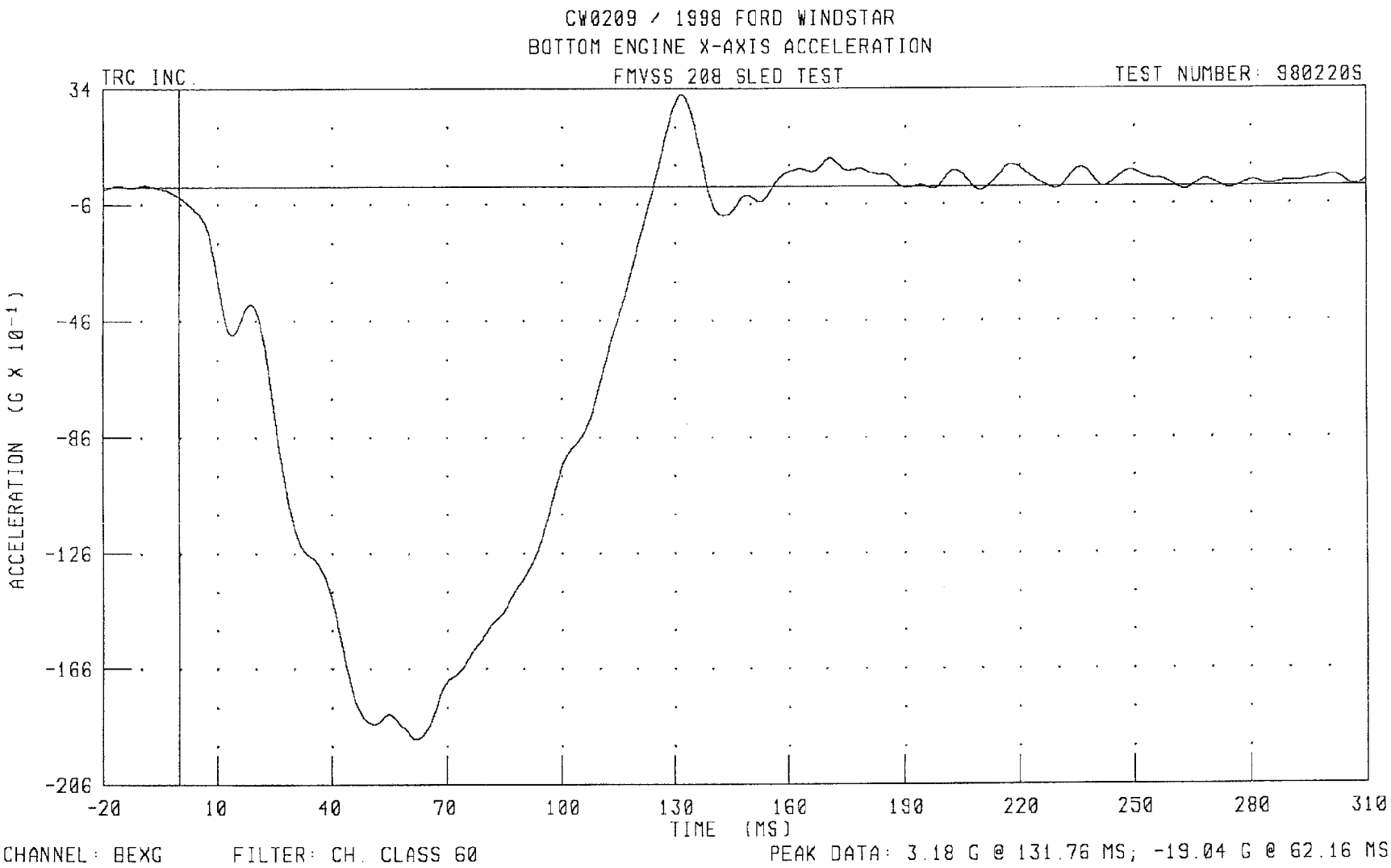

CW0209 / 1998 FORD WINDSTAR
RIGHT BODY X-AXIS ACCELERATION
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
22
-15
-52
-89
-126
-163
-200
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RBXG
FILTER: CH. CLASS 60
PEAK DATA: 2.06 G @ 128.96 MS; -18.46 G @ 56.56 MS



980220

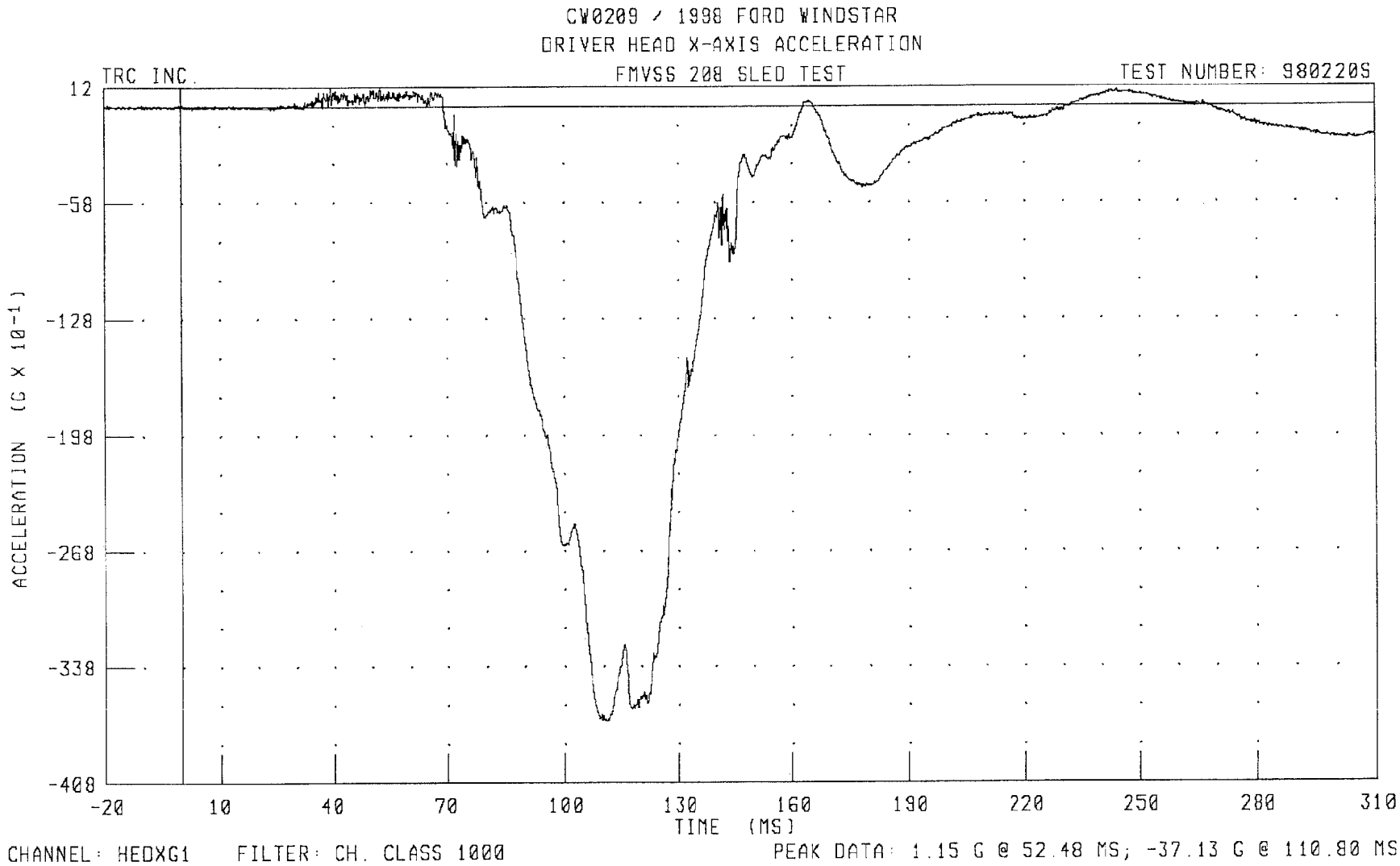

CW0209 / 1998 FORD WINDSTAR
LEFT FRAME X-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
40
0
-40
-80
-120
-160
-200
ACCELERATION (G X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFXG
FILTER: CH. CLASS 60
PEAK DATA: 3.66 G @ 161.28 MS; -18.45 G @ 57.60 MS


CW0209 / 1998 FORD WINDSTAR
RIGHT FRAME X-AXIS ACCELERATION
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
22
-15
-52
-89
-126
-163
-200
ACCELERATION (G X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFXG
FILTER: CH. CLASS 60
PEAK DATA: 2.01 G @ 128.96 MS; -18.70 G @ 56.64 MS


CW0209 / 1998 FORD WINDSTAR
BOTTOM ENGINE X-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
34
-6
-46
-86
-126
-166
-206
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: BEXG
FILTER: CH. CLASS 60
PEAK DATA: 3.18 G @ 131.76 MS; -19.04 G @ 62.16 MS

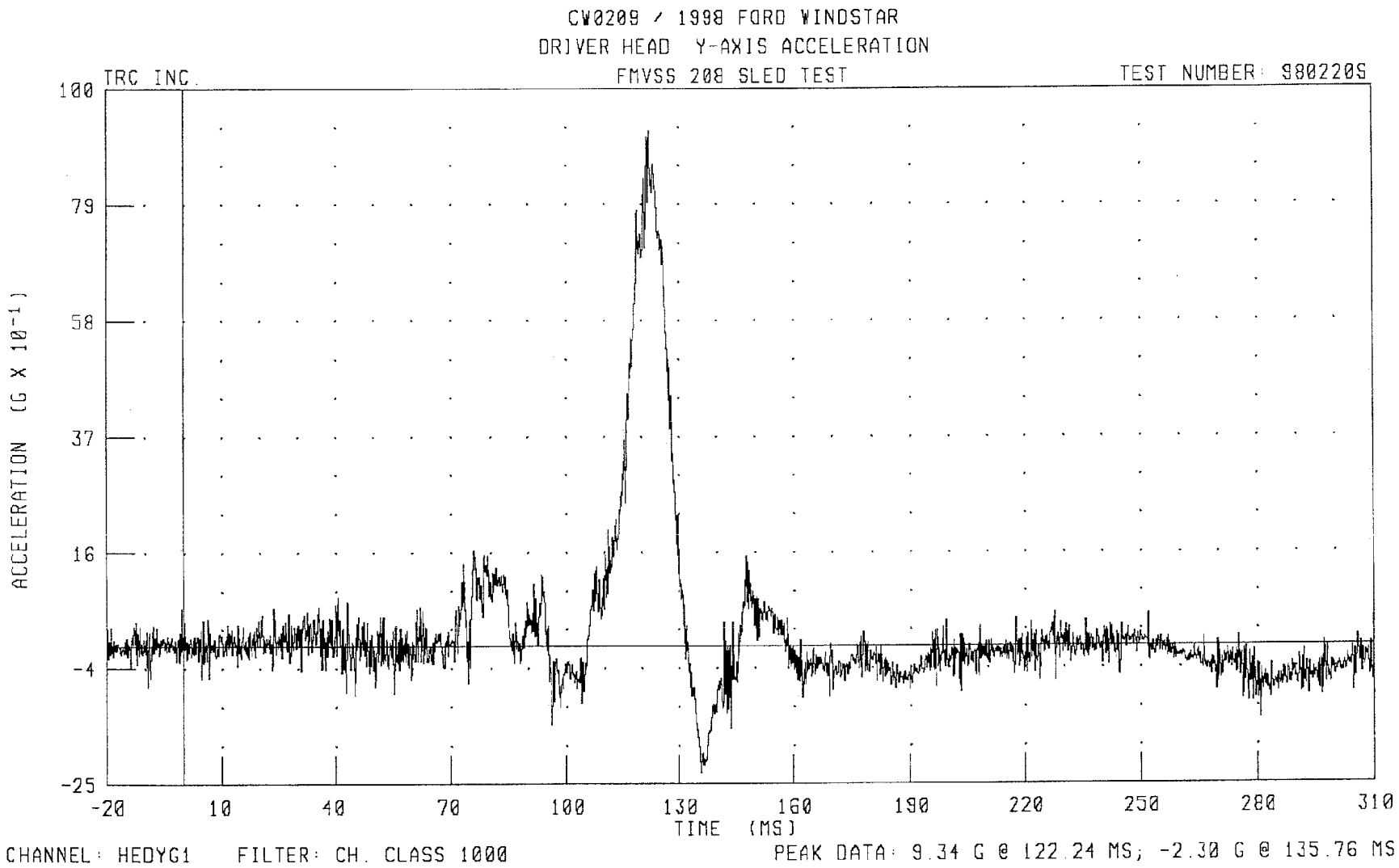


980220


CW0209 / 1998 FORD WINDSTAR
DRIVER HEAD X-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
12
-58
-128
-198
-268
-338
-408
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDXG1
FILTER: CH. CLASS 1000
PEAK DATA: 1.15 G @ 52.48 MS; -37.13 G @ 110.80 MS

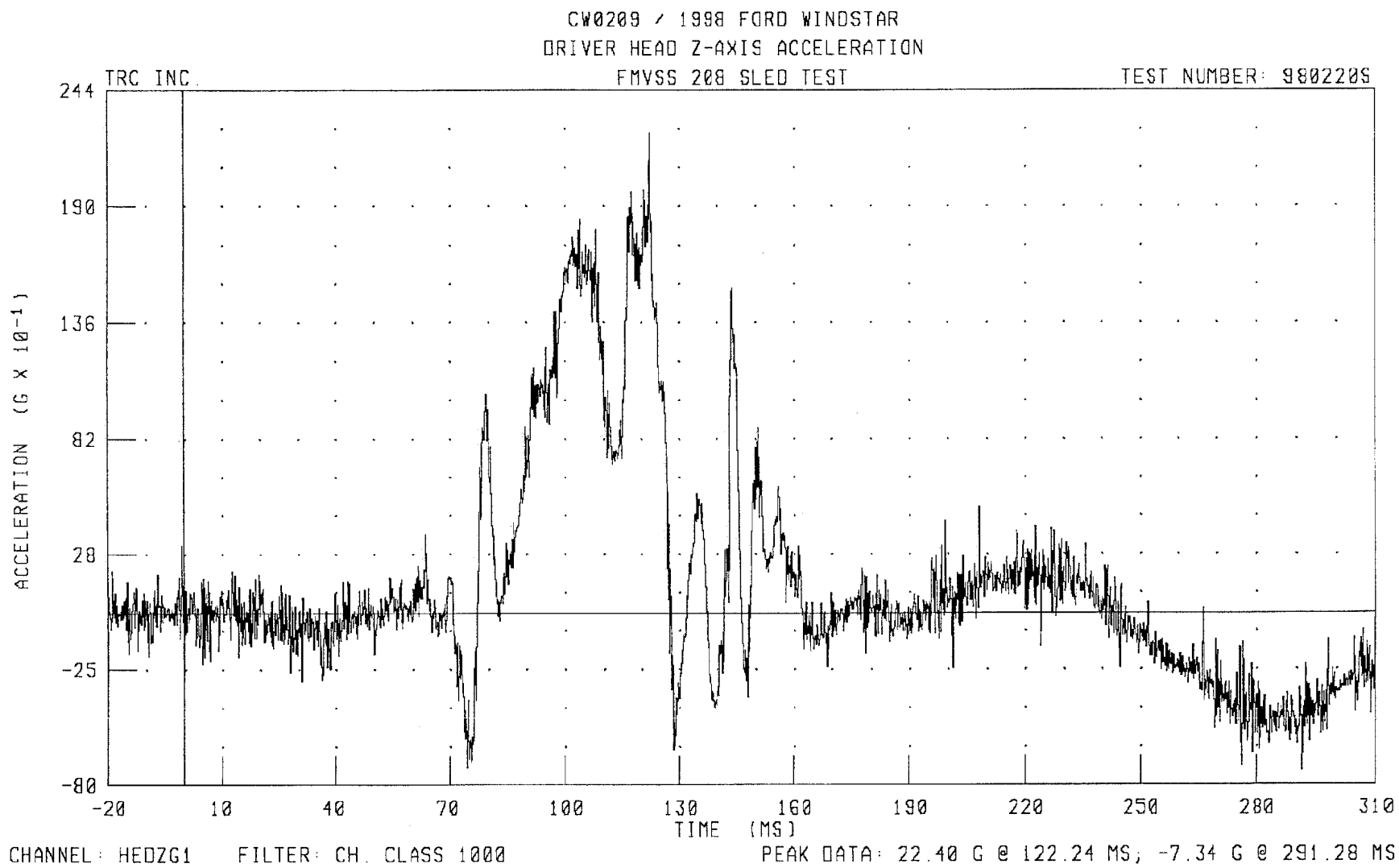


980220


CW0209 / 1998 FORD WINDSTAR
DRIVER HEAD Y-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
100
79
58
37
16
-4
-25
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG1
FILTER: CH. CLASS 1000
PEAK DATA: 9.34 G @ 122.24 MS; -2.30 G @ 135.76 MS

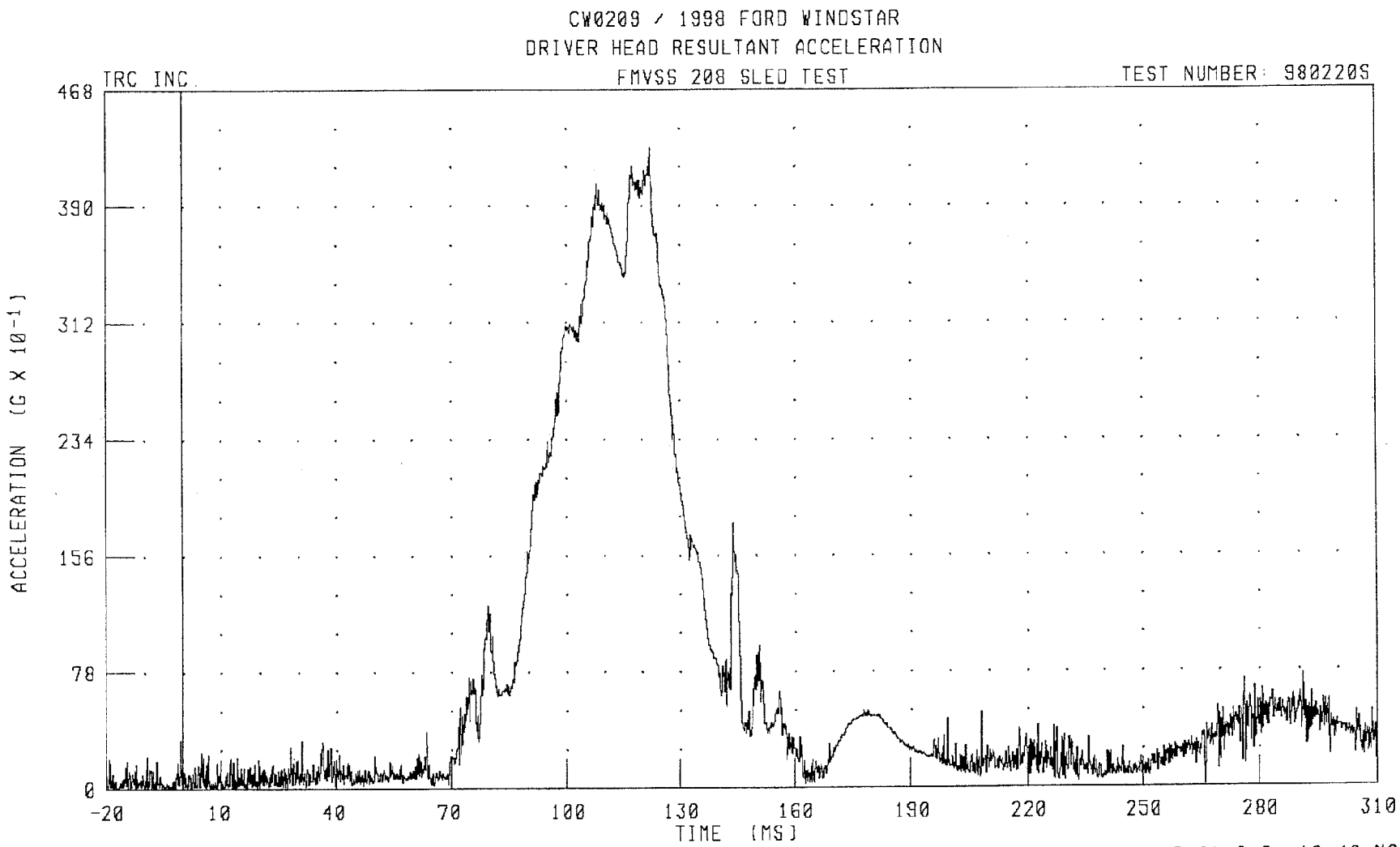


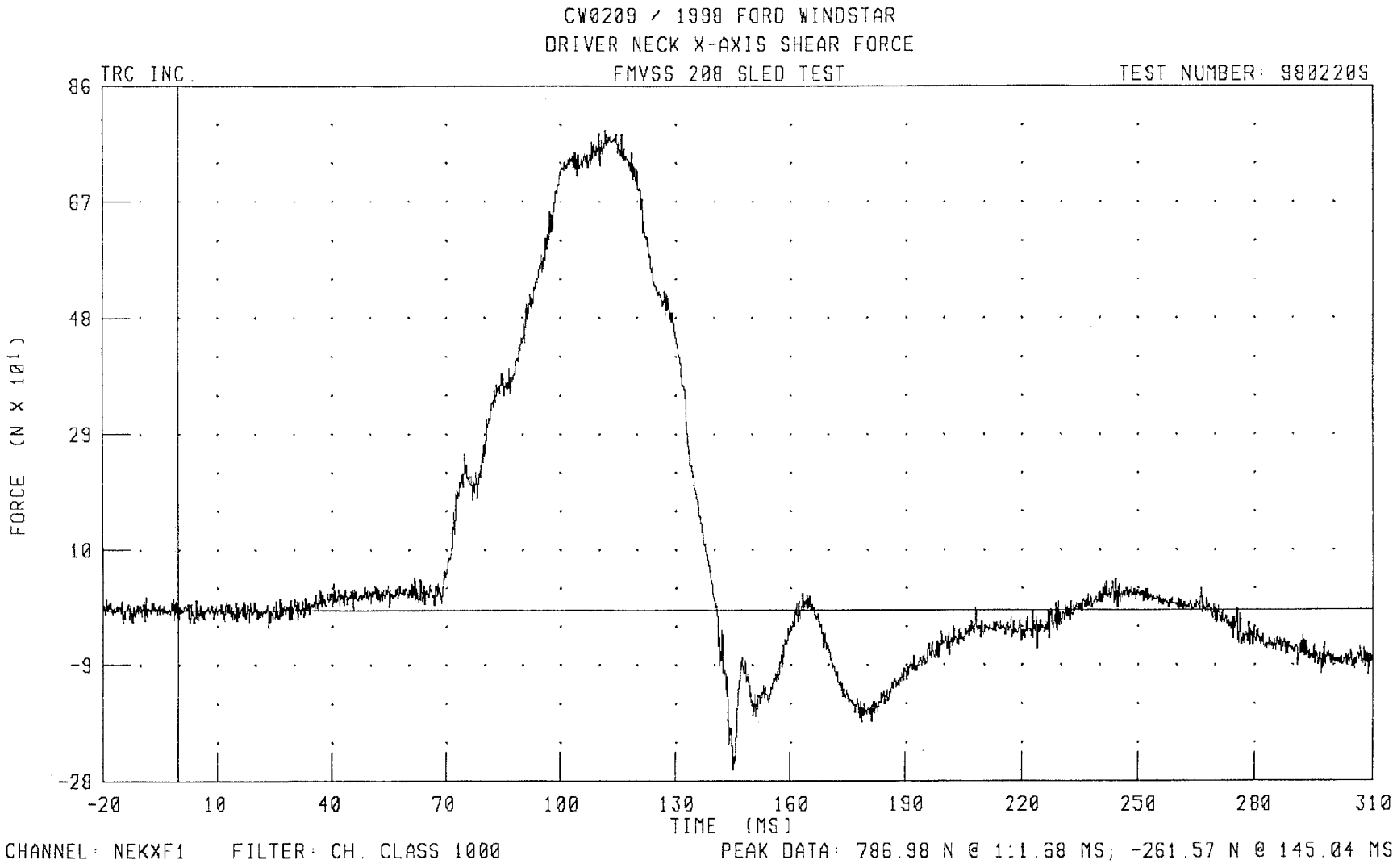
980220


CW0209 / 1998 FORD WINDSTAR
DRIVER HEAD Z-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
244
190
136
82
28
-25
-80
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDZG1
FILTER: CH. CLASS 1000
PEAK DATA: 22.40 G @ 122.24 MS; -7.34 G @ 291.28 MS



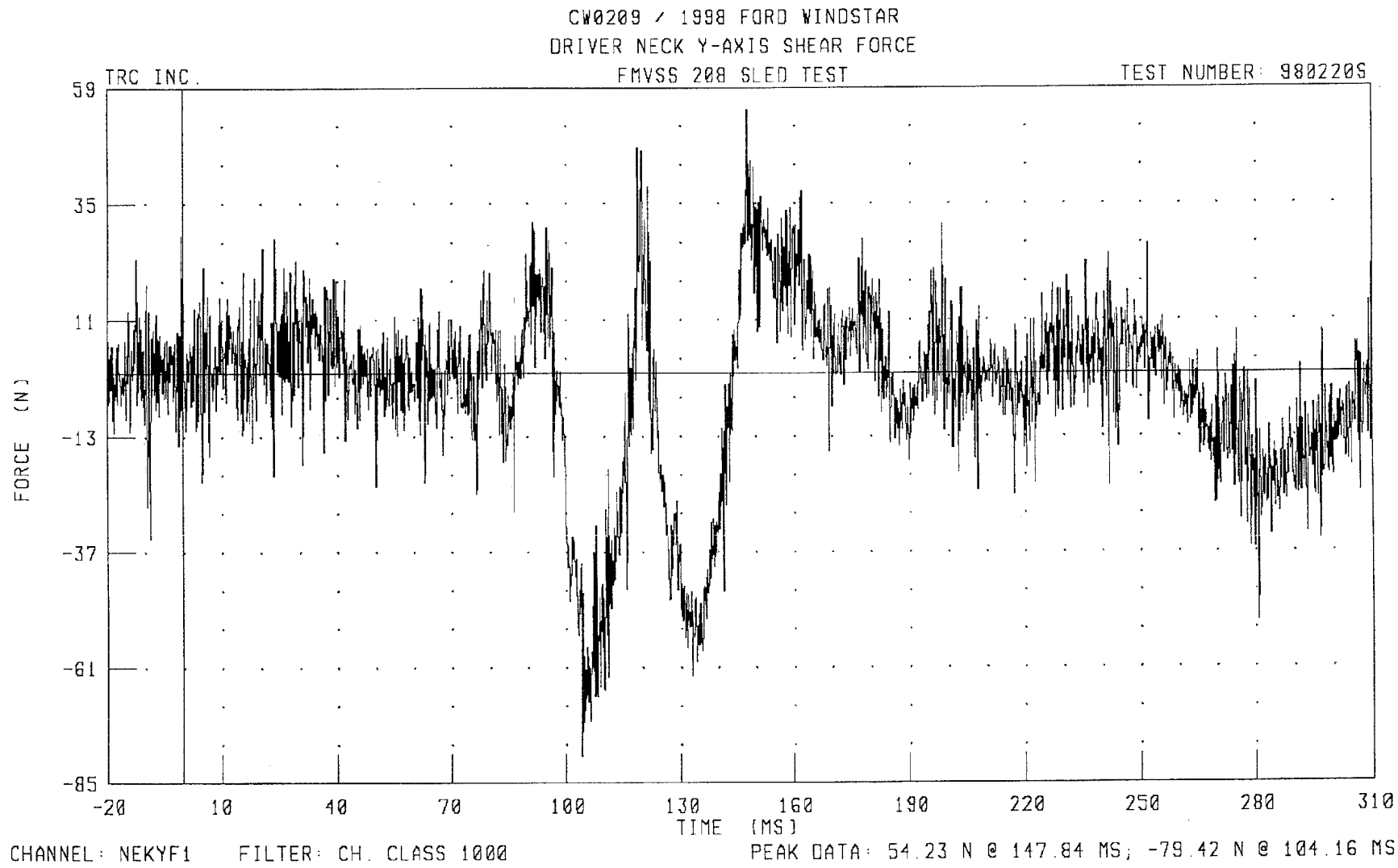
980220

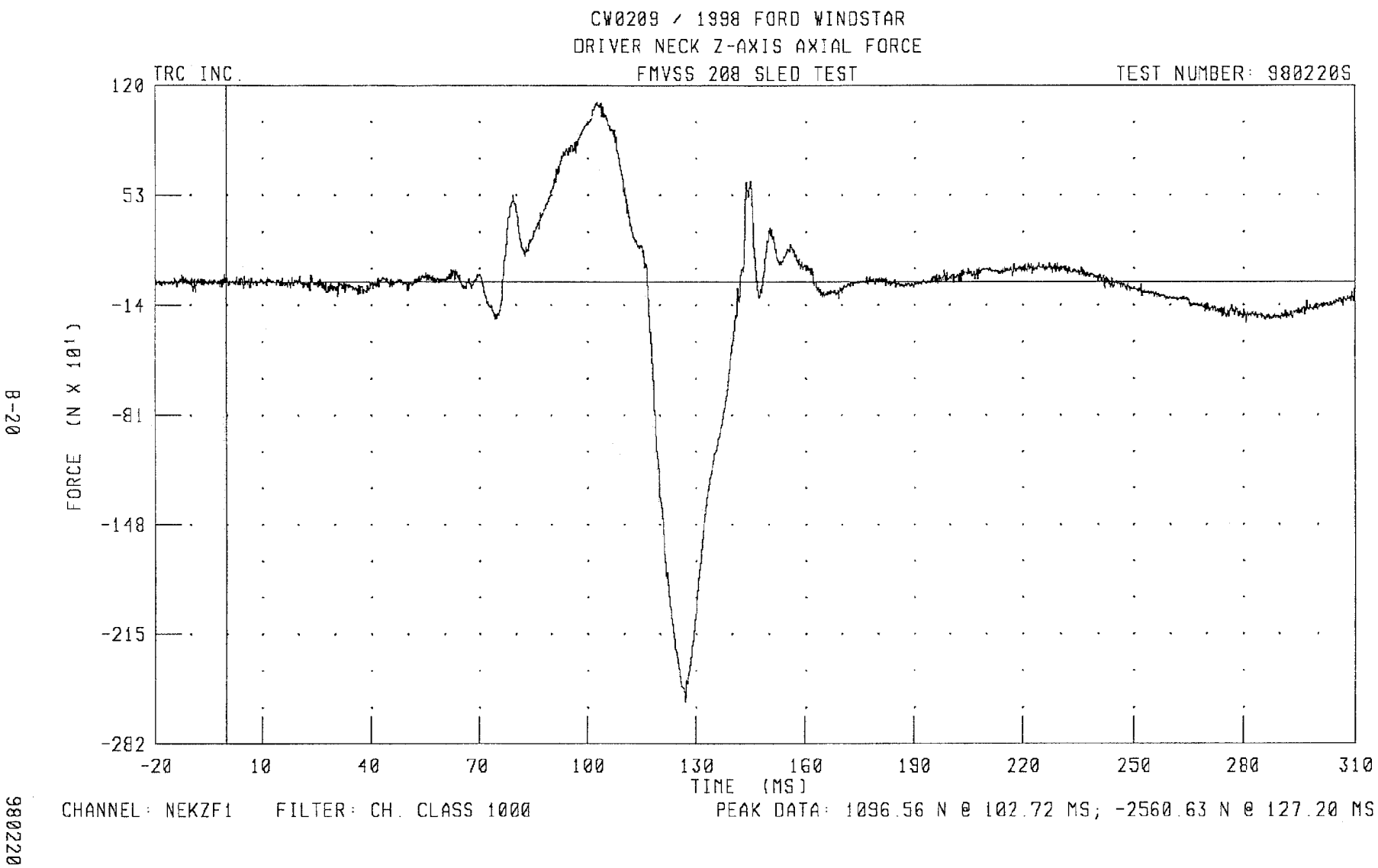

CW0209 / 1998 FORD WINDSTAR
DRIVER HEAD RESULTANT ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
468
390
312
234
156
78
0
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG1
FILTER: CH. CLASS 1000
PEAK DATA: 42.89 G @ 122.24 MS; 0.01 G @ -16.48 MS


CW0209 / 1998 FORD WINDSTAR
DRIVER NECK X-AXIS SHEAR FORCE
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
86
67
48
29
10
-9
-28
FORCE (N X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKXF1
FILTER: CH. CLASS 1000
PEAK DATA: 786.98 N @ 111.68 MS; -261.57 N @ 145.04 MS



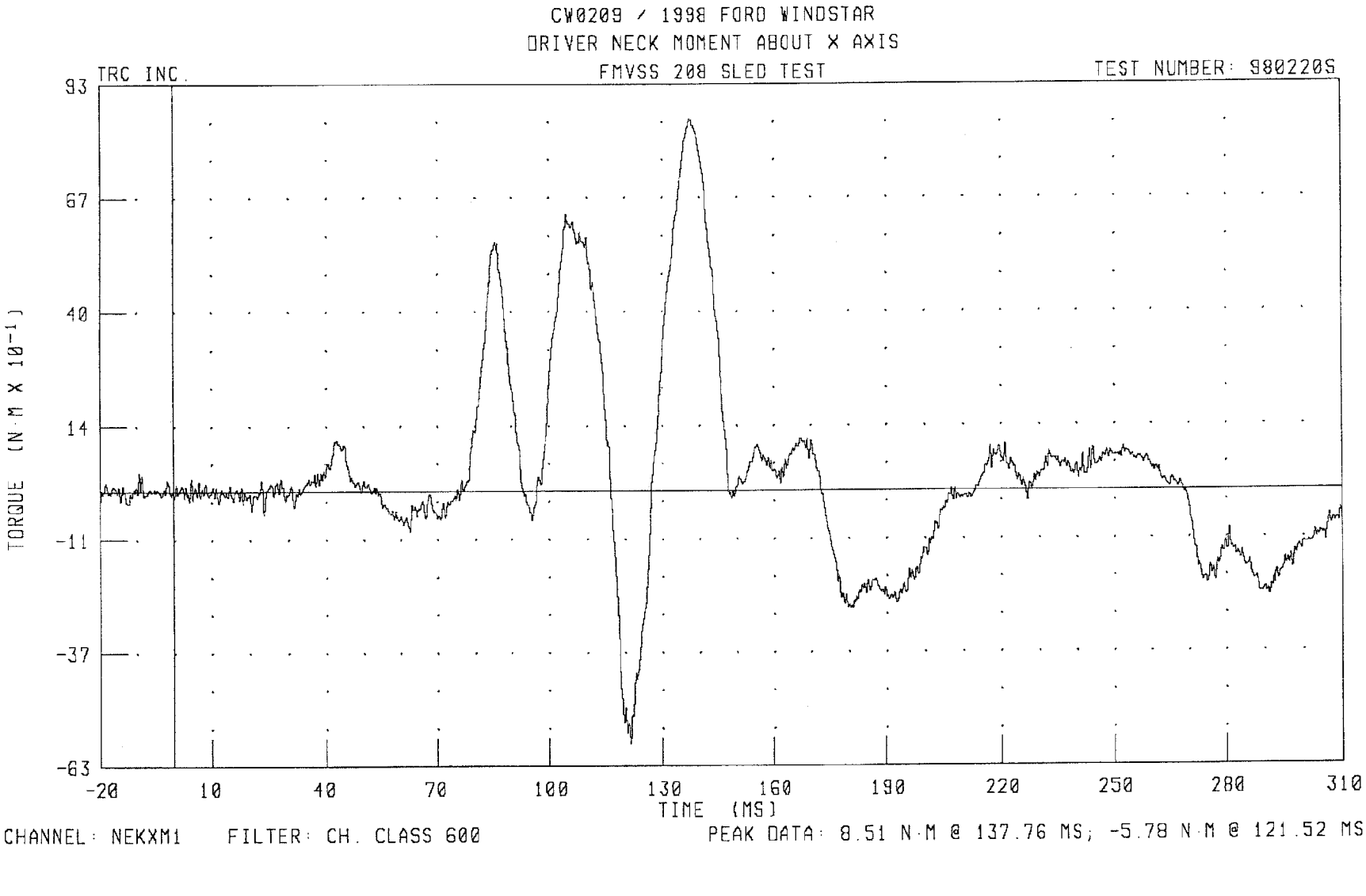
980220

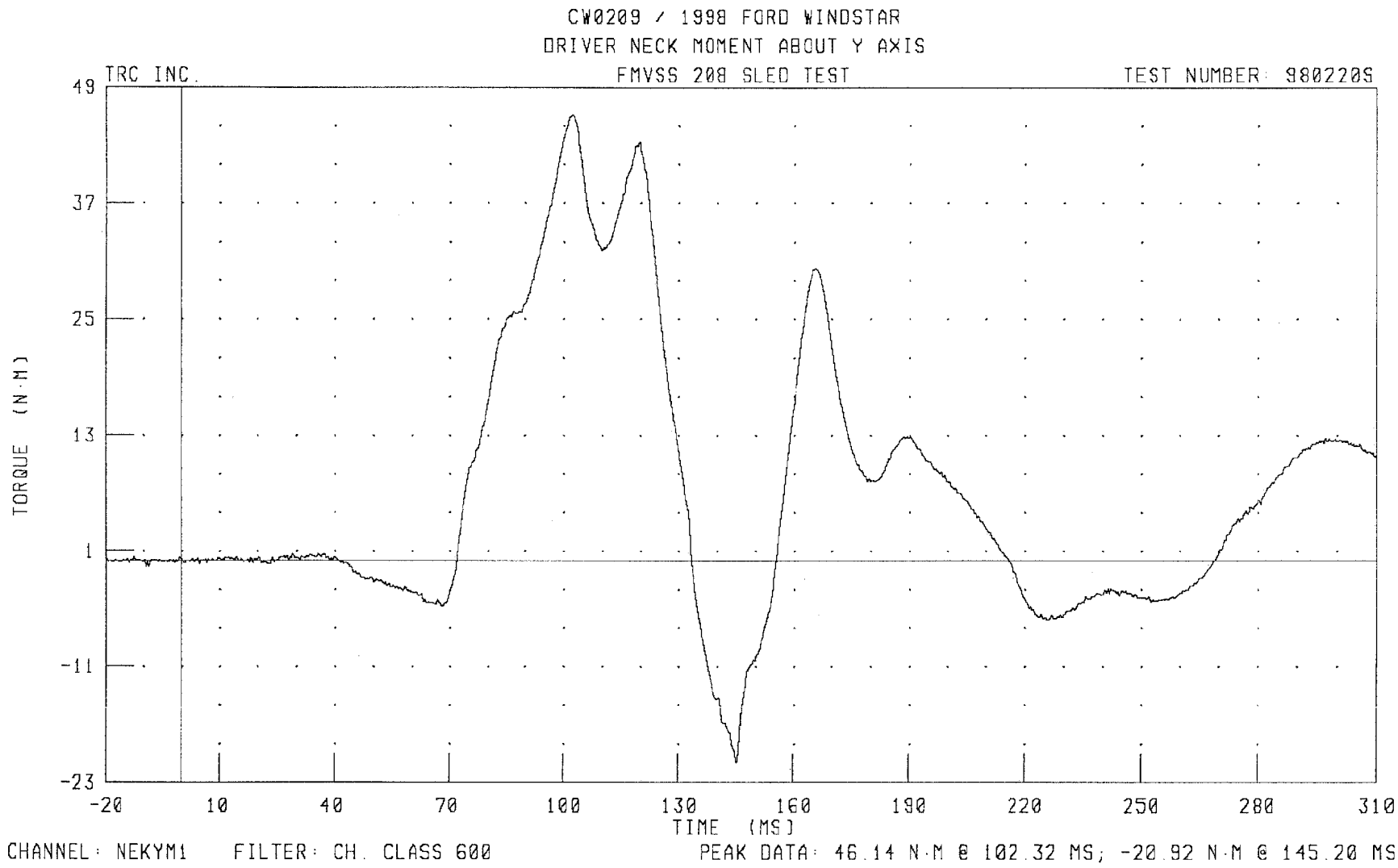

CW0209 / 1998 FORD WINDSTAR
DRIVER NECK Y-AXIS SHEAR FORCE
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
59
35
11
-13
-37
-61
-85
FORCE (N)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKYF1
FILTER: CH. CLASS 1000
PEAK DATA: 54.23 N @ 147.84 MS; -79.42 N @ 104.16 MS


CW0209 / 1998 FORD WINDSTAR
DRIVER NECK Z-AXIS AXIAL FORCE
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
120
53
-14
-81
-148
-215
-282
FORCE (N X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKZF1
FILTER: CH. CLASS 1000
PEAK DATA: 1096.56 N @ 102.72 MS; -2560.63 N @ 127.20 MS



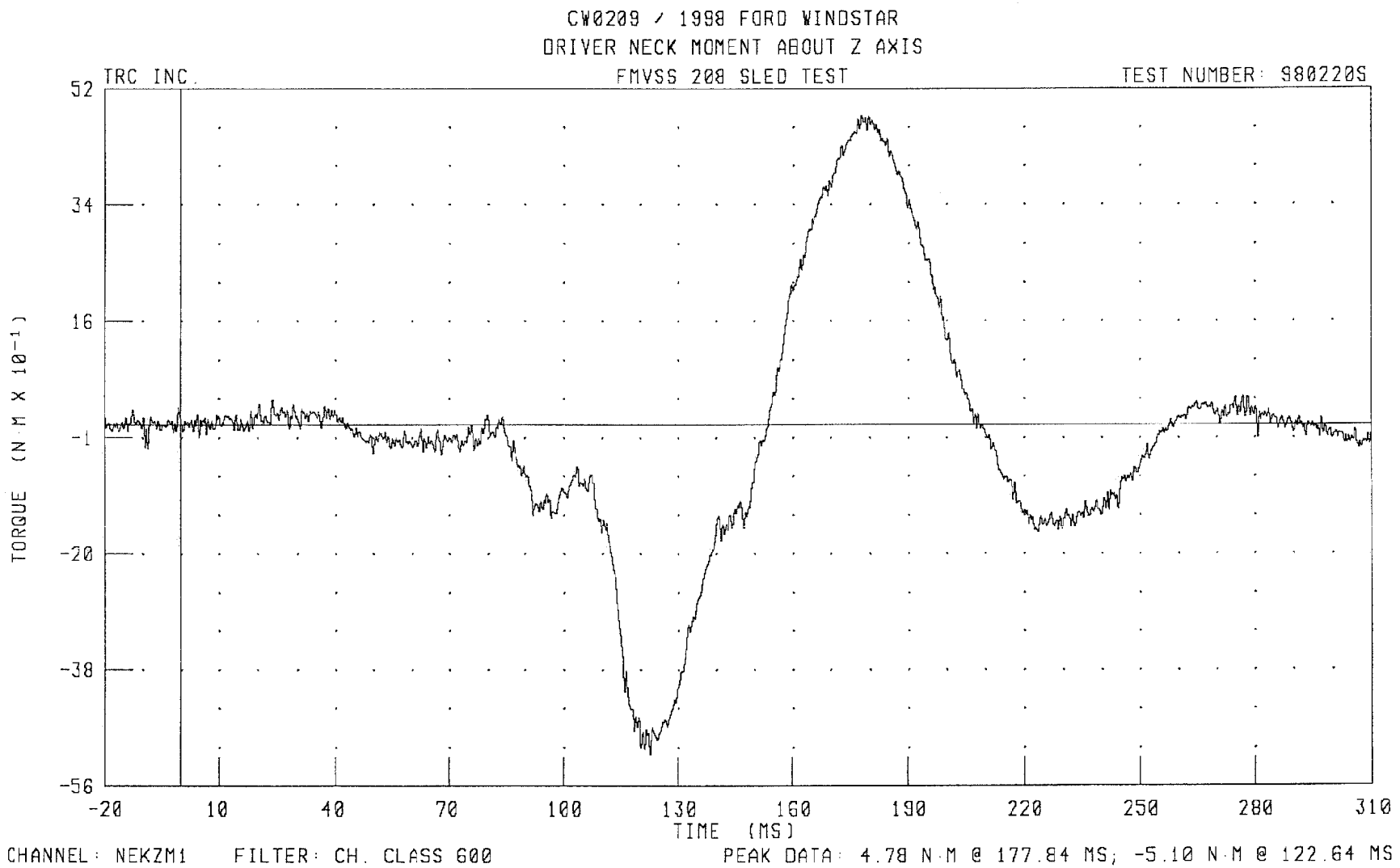
980220


CW0209 / 1998 FORD WINDSTAR
DRIVER NECK MOMENT ABOUT X AXIS
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
93
67
40
14
-11
-37
-63
TORQUE (N-M X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKXM1
FILTER: CH. CLASS 600
PEAK DATA: 8.51 N-M @ 137.76 MS; -5.78 N-M @ 121.52 MS

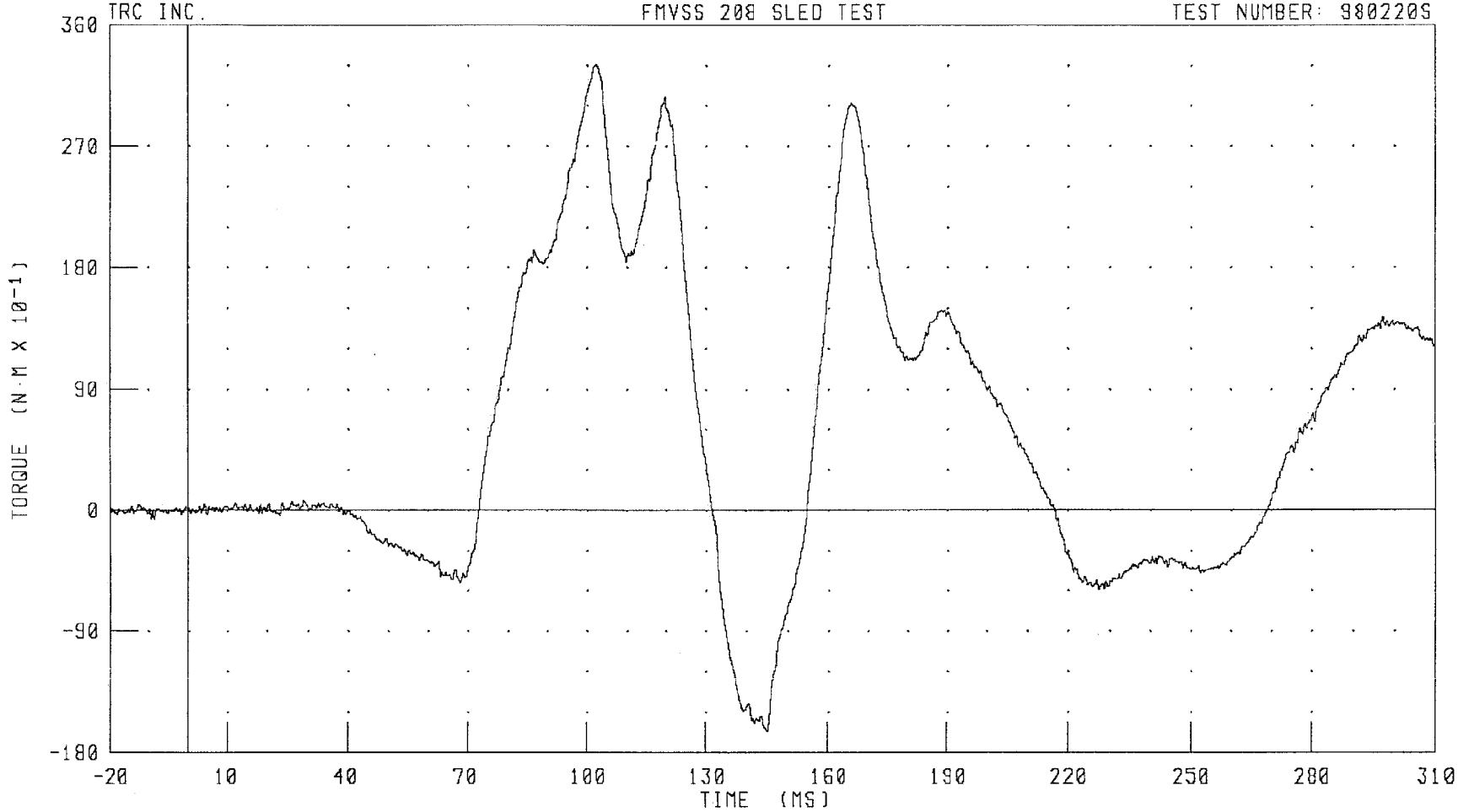

CW0209 / 1998 FORD WINDSTAR
DRIVER NECK MOMENT ABOUT Y AXIS
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
TORQUE (N-M)
49
37
25
13
1
-11
-23
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKYM1
FILTER: CH. CLASS 600
PEAK DATA: 46.14 N-M @ 102.32 MS; -20.92 N-M @ 145.20 MS



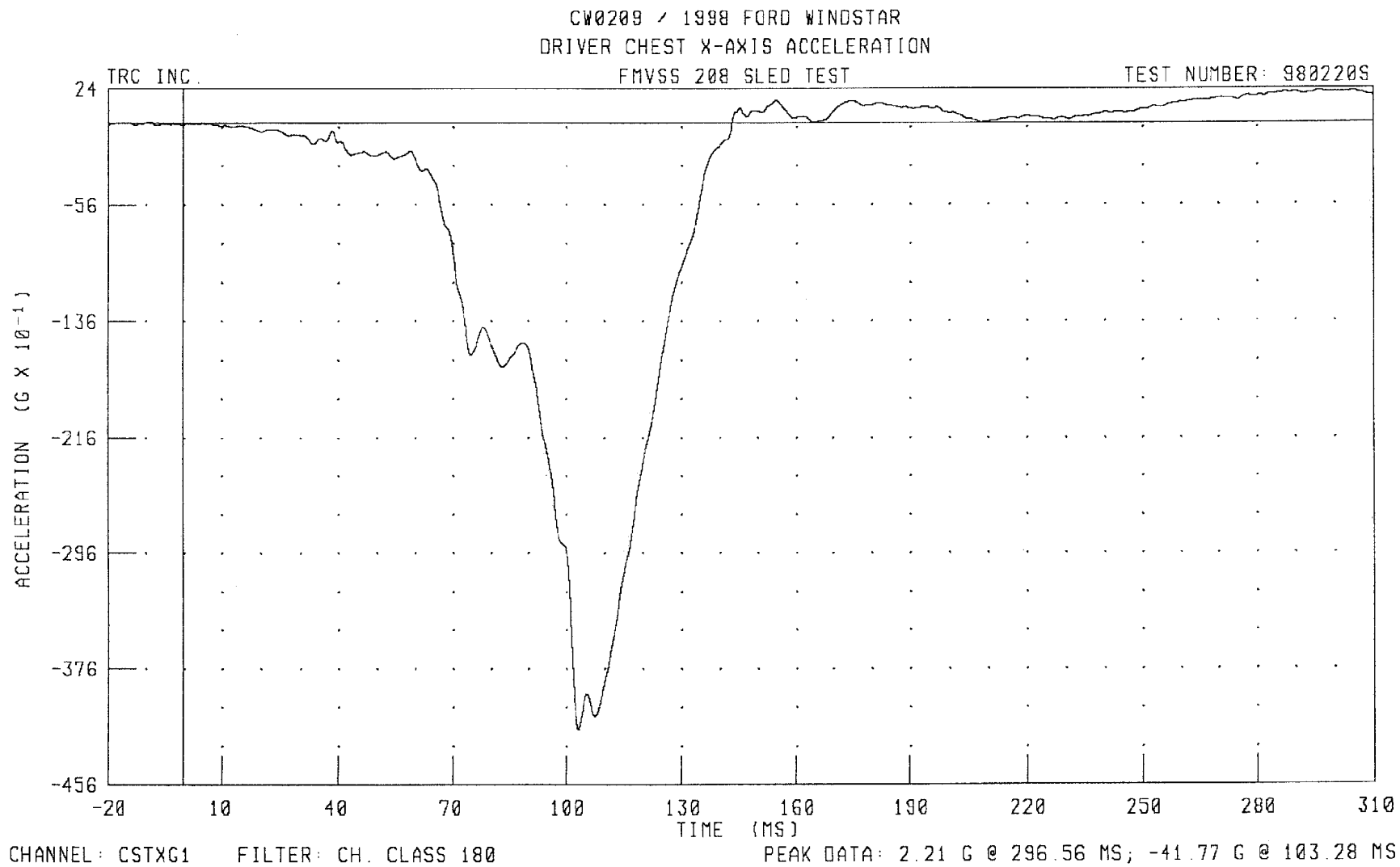
980220


CW0209 / 1998 FORD WINDSTAR
DRIVER NECK MOMENT ABOUT Z AXIS
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
52
34
16
-1
-20
-38
-56
TORQUE (N·M X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKZM1
FILTER: CH. CLASS 600
PEAK DATA: 4.78 N·M @ 177.84 MS; -5.10 N·M @ 122.64 MS

CW0209 / 1998 FORD WINDSTAR
DRIVER NECK OCCIPITAL CONDYLE ABOUT Y AXIS
TRC INC. FMVSS 208 SLED TEST TEST NUMBER: 980220S

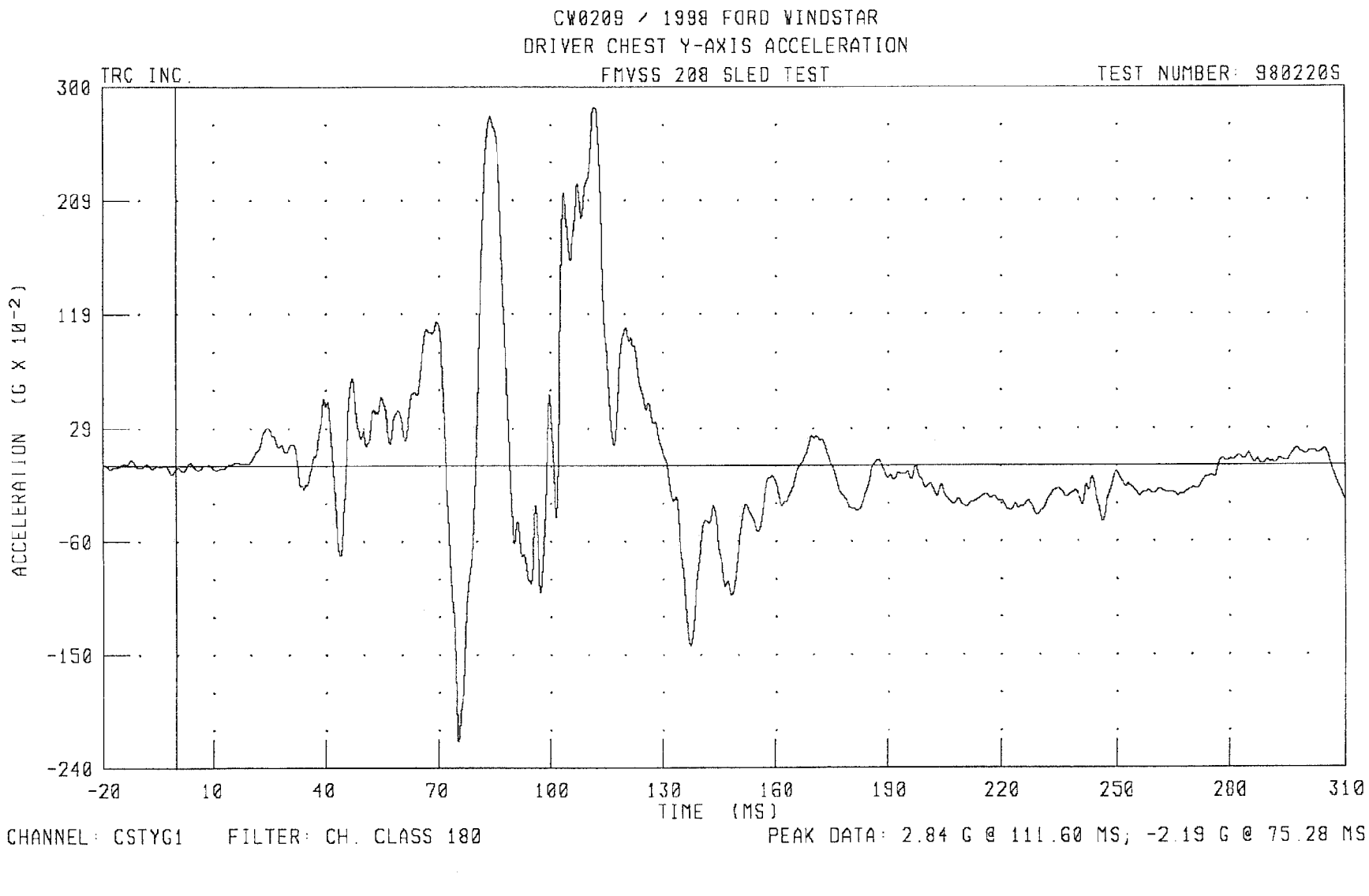



CHANNEL: NEKOM1 FILTER: CH. CLASS 600 PEAK DATA: 33.07 N·M @ 102.24 MS; -16.43 N·M @ 145.20 MS


CW0209 / 1998 FORD WINDSTAR
DRIVER CHEST X-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
24
-56
-136
-216
-296
-376
-456
ACCELERATION (G X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXG1
FILTER: CH. CLASS 180
PEAK DATA: 2.21 G @ 296.56 MS; -41.77 G @ 103.28 MS

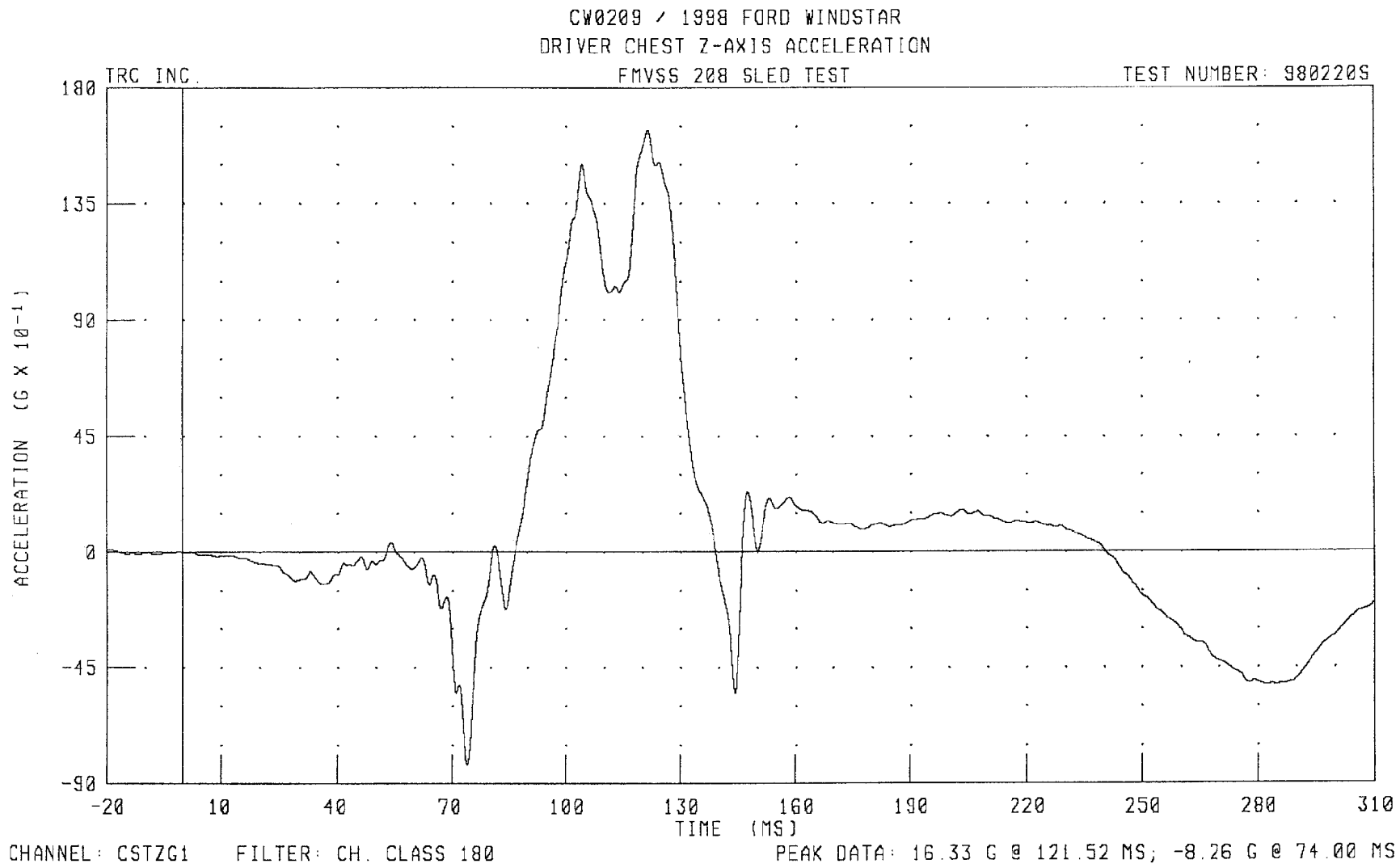


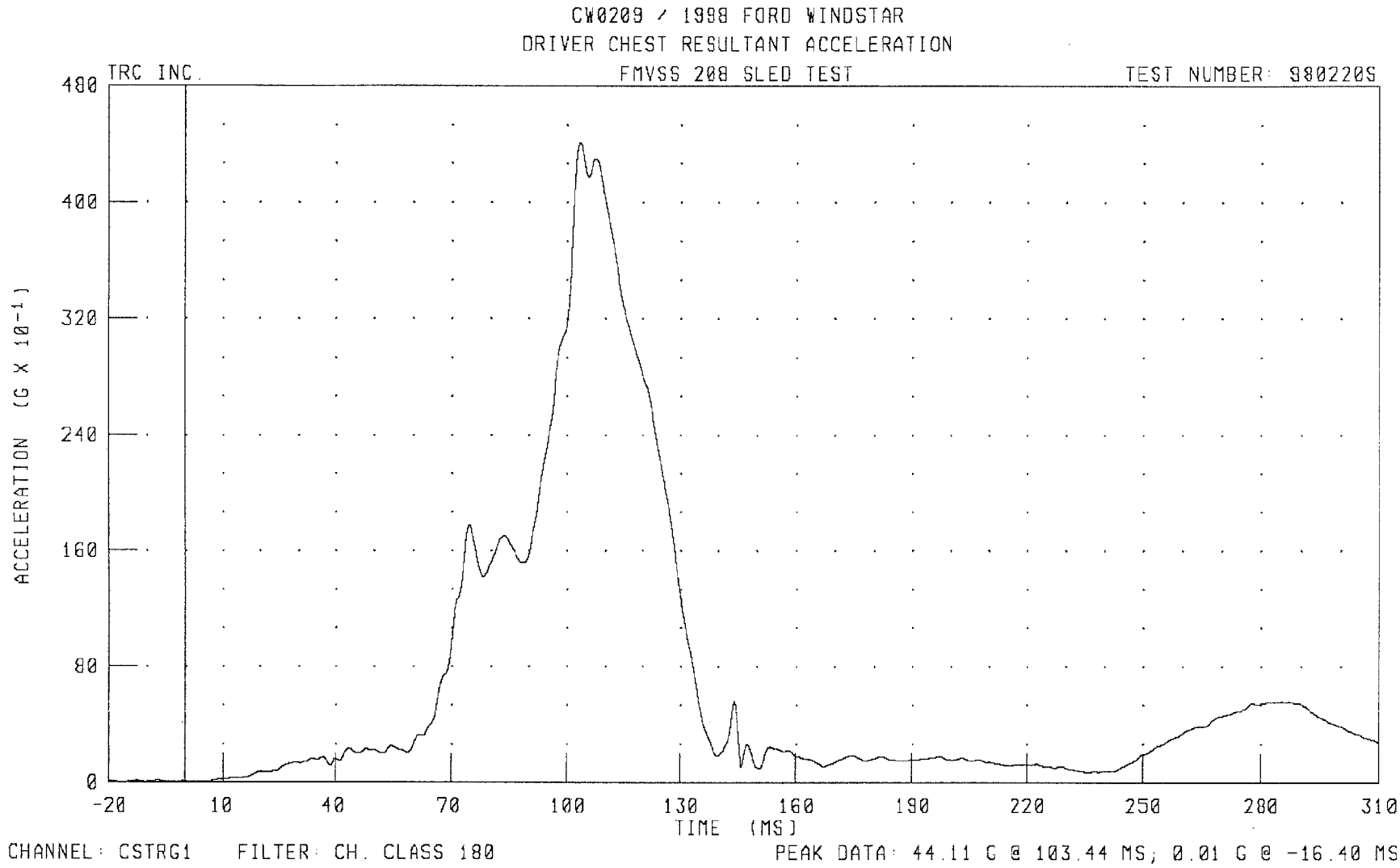
980220

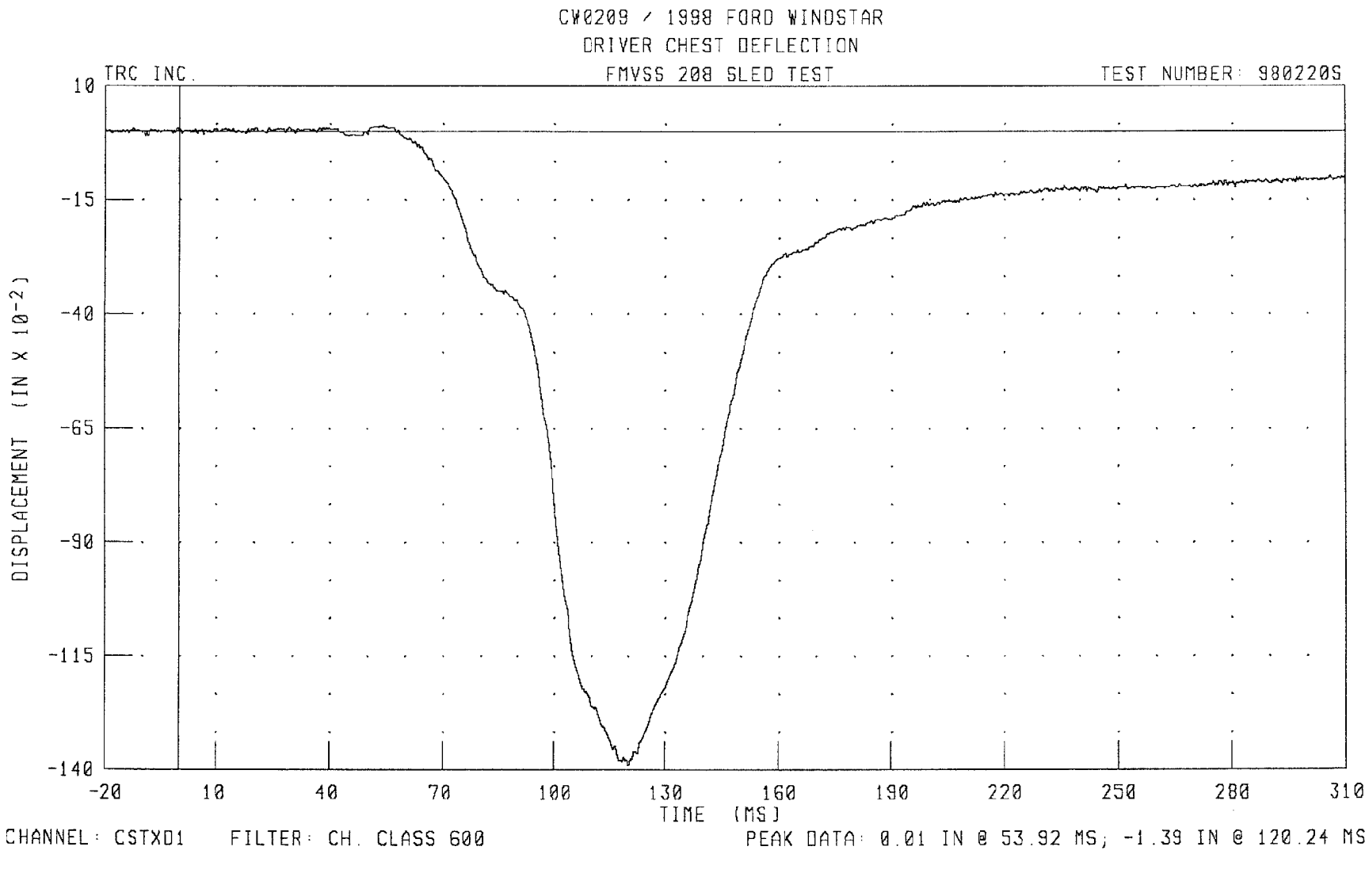

CW0209 / 1998 FORD WINDSTAR
DRIVER CHEST Y-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
300
209
119
29
-60
-150
-240
ACCELERATION (G X 10-2)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTYG1
FILTER: CH. CLASS 180
PEAK DATA: 2.84 G @ 111.60 MS; -2.19 G @ 75.28 MS



980220

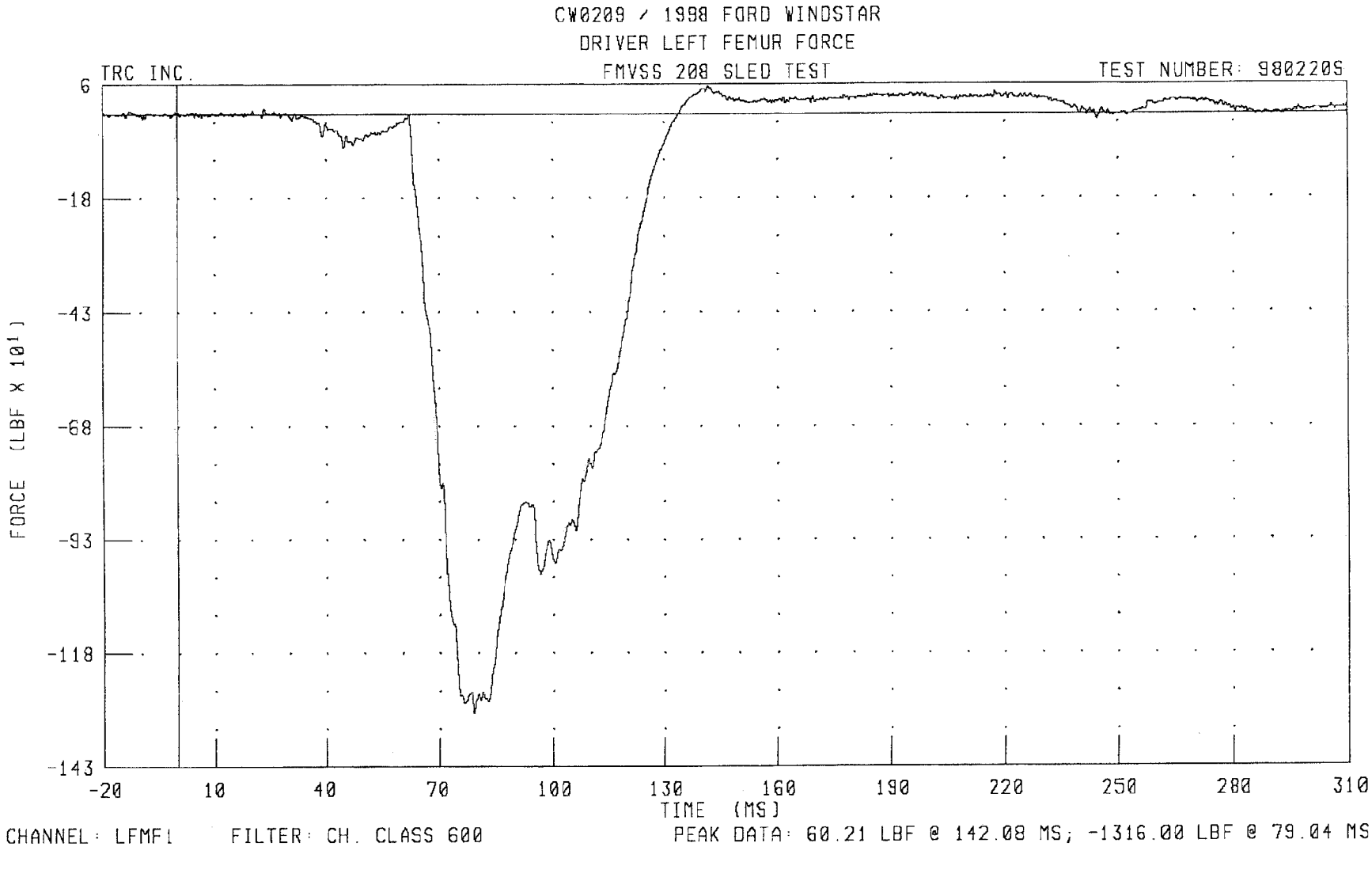

CW0209 / 1998 FORD WINDSTAR
DRIVER CHEST Z-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
180
135
90
45
0
-45
-90
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZG1
FILTER: CH. CLASS 180
PEAK DATA: 16.33 G @ 121.52 MS; -8.26 G @ 74.00 MS


CW0209 / 1998 FORD WINDSTAR
DRIVER CHEST RESULTANT ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
480
400
320
240
160
80
0
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRG1
FILTER: CH. CLASS 180
PEAK DATA: 44.11 G @ 103.44 MS; 0.01 G @ -16.40 MS


CW0209 / 1998 FORD WINDSTAR
DRIVER CHEST DEFLECTION
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
10
-15
-40
-65
-90
-115
-140
DISPLACEMENT (IN X 10-2)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXD1
FILTER: CH. CLASS 600
PEAK DATA: 0.01 IN @ 53.92 MS; -1.39 IN @ 120.24 MS

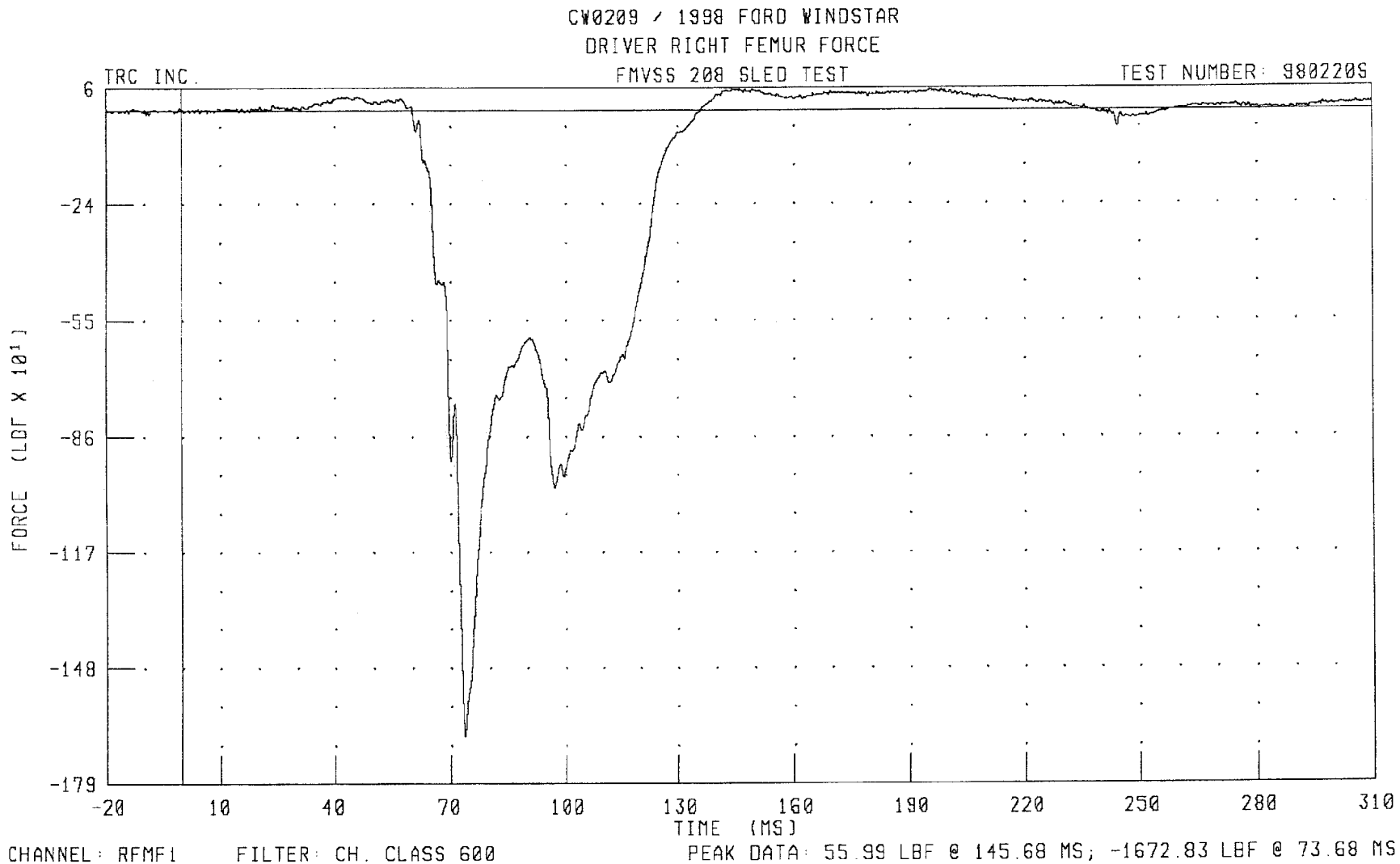


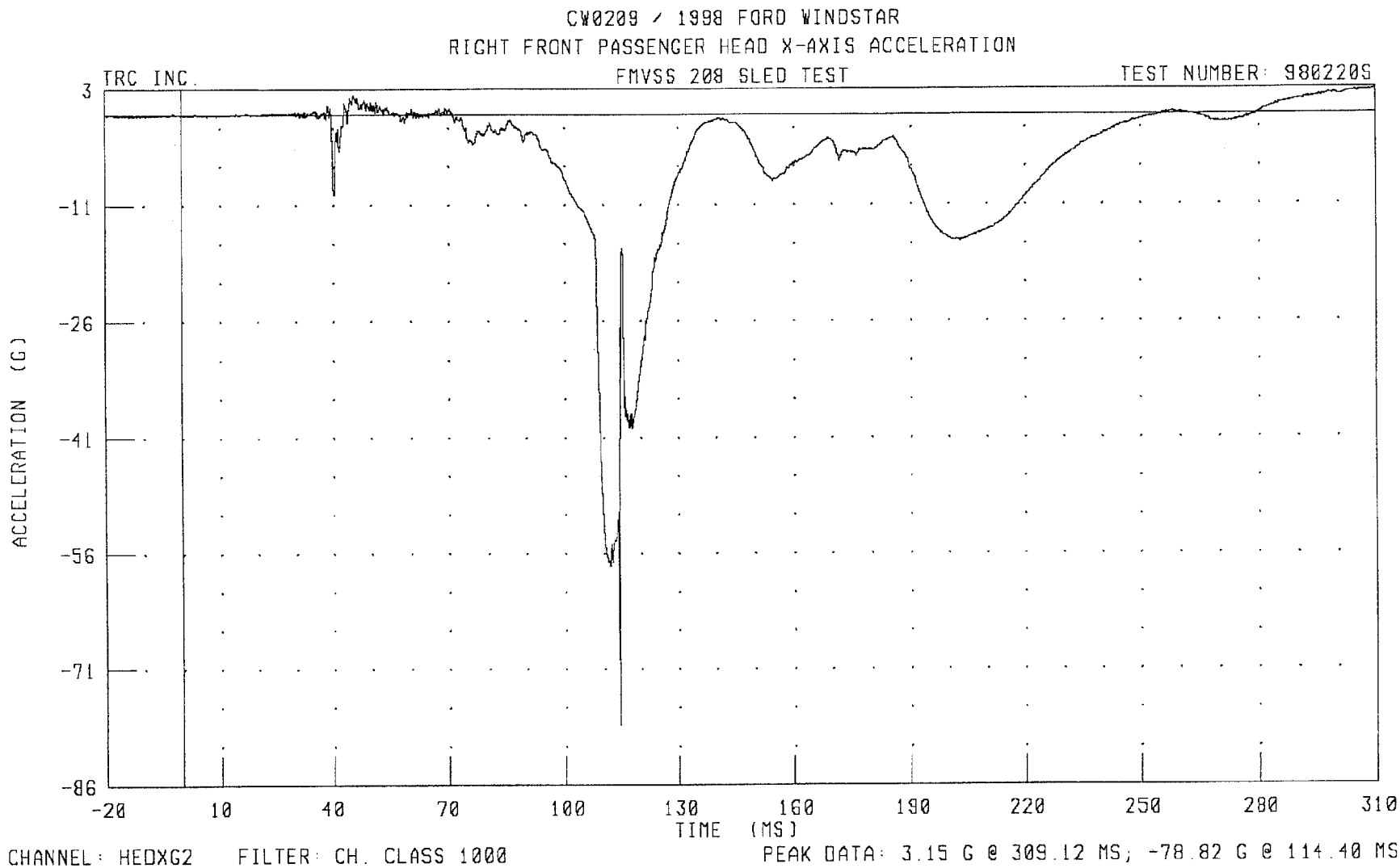
980220

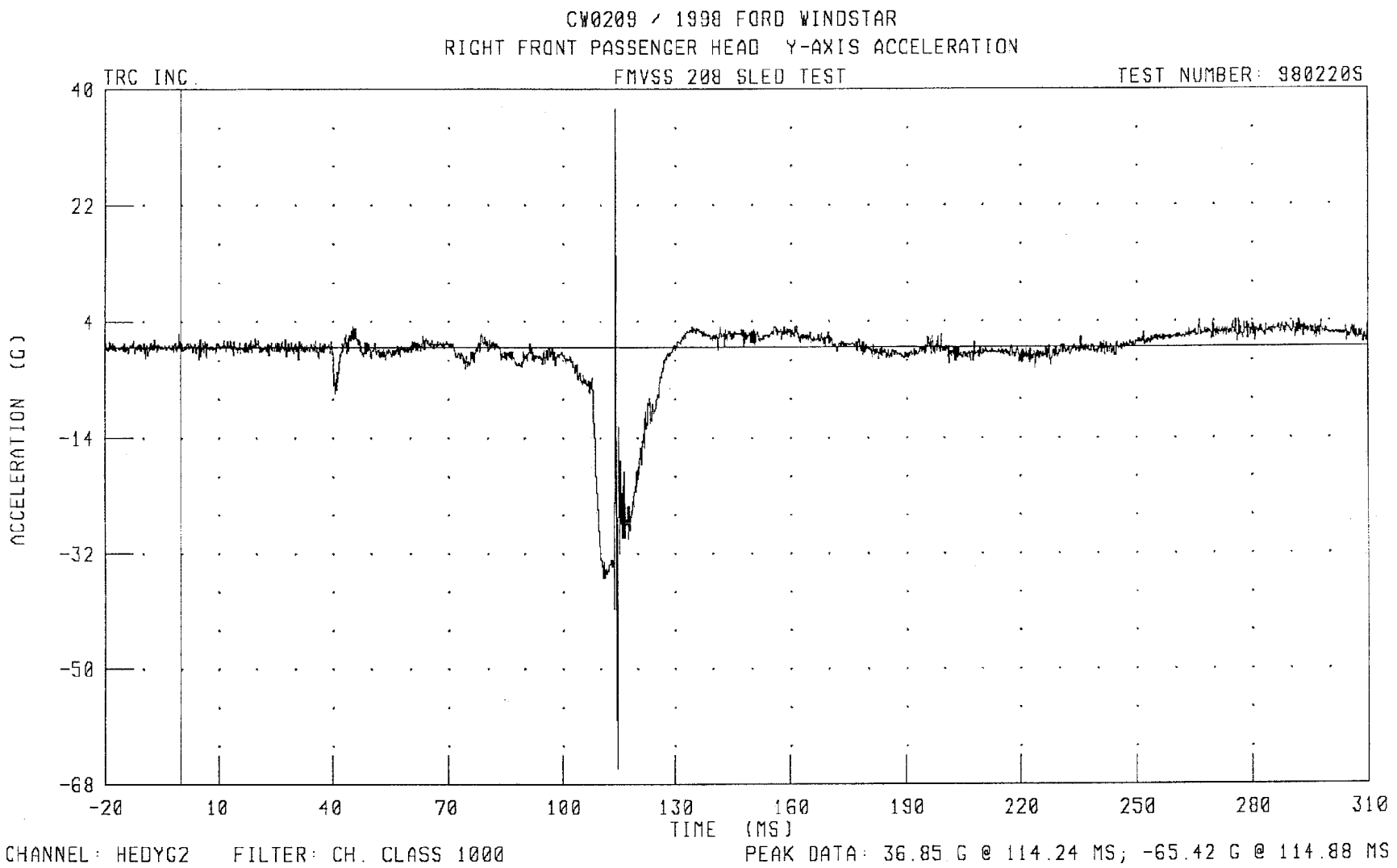

CW0209 / 1998 FORD WINDSTAR
DRIVER LEFT FEMUR FORCE
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
6
-18
-43
-68
-93
-118
-143
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF1
FILTER: CH. CLASS 600
PEAK DATA: 60.21 LBF @ 142.08 MS; -1316.00 LBF @ 79.04 MS



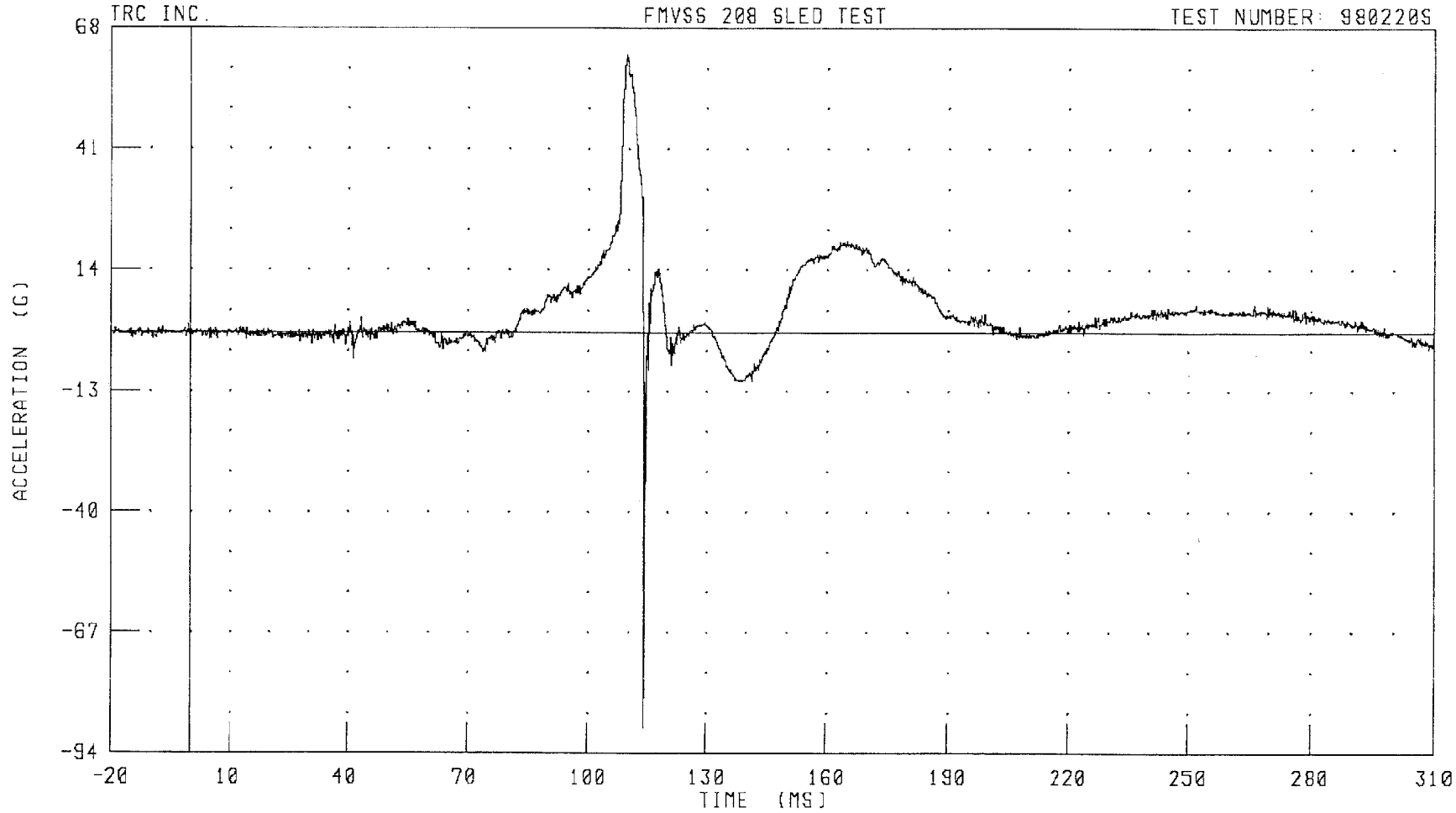
980220


CW0209 / 1998 FORD WINDSTAR
DRIVER RIGHT FEMUR FORCE
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
6
-24
-55
-86
-117
-148
-179
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFMF1
FILTER: CH. CLASS 600
PEAK DATA: 55.99 LBF @ 145.68 MS; -1672.83 LBF @ 73.68 MS


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER HEAD X-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
3
-11
-26
-41
-56
-71
-86
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDXG2
FILTER: CH. CLASS 1000
PEAK DATA: 3.15 G @ 309.12 MS; -78.82 G @ 114.40 MS


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER HEAD Y-AXIS ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
40
22
4
-14
-32
-50
-68
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDYG2
FILTER: CH. CLASS 1000
PEAK DATA: 36.85 G @ 114.24 MS; -65.42 G @ 114.88 MS

CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER HEAD Z-AXIS ACCELERATION




CHANNEL: HEDZG2 FILTER: CH. CLASS 1000

PEAK DATA: 61.94 G @ 109.68 MS; -88.22 G @ 114.24 MS



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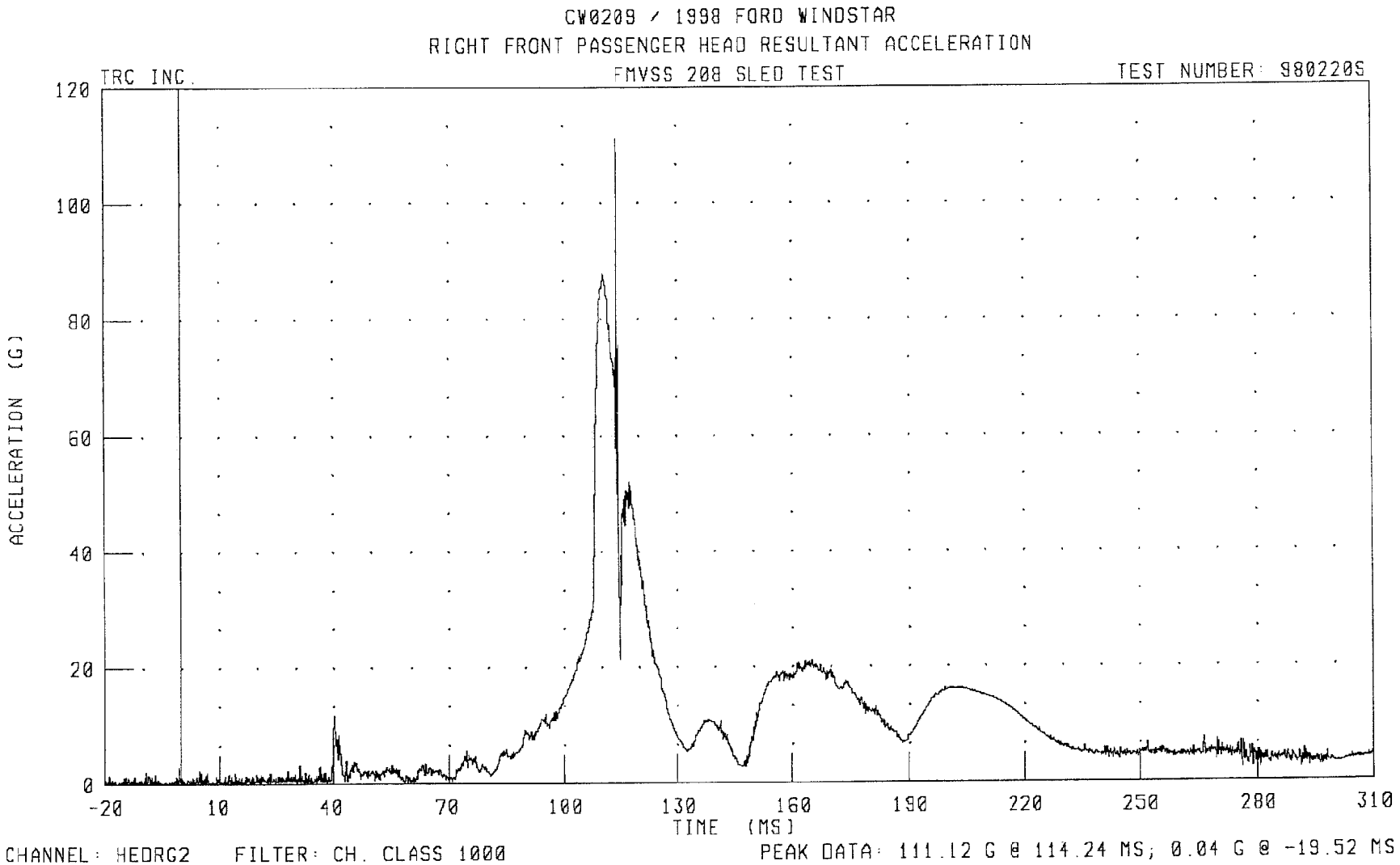
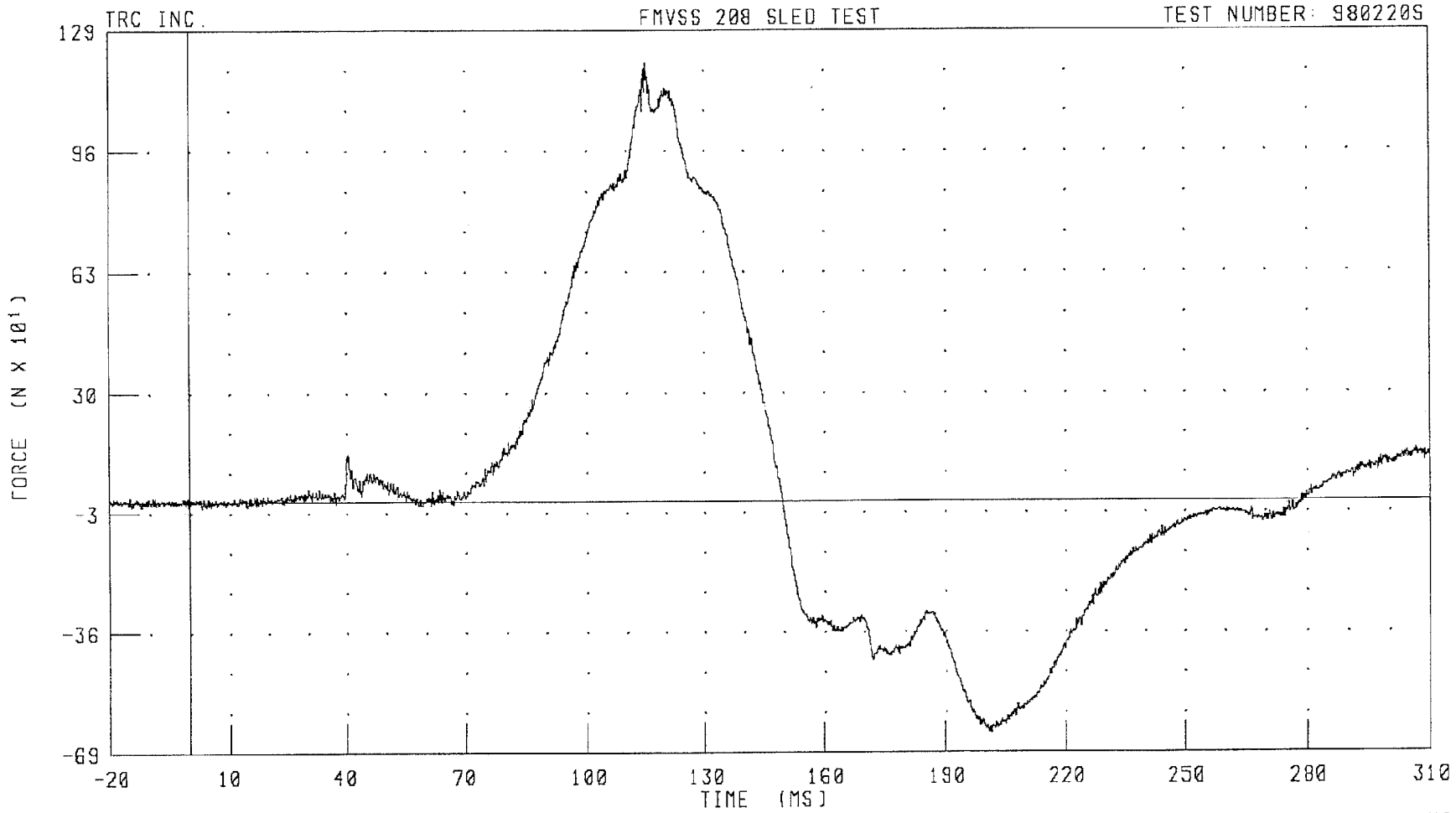

CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER HEAD RESULTANT ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
120
100
80
60
40
20
0
ACCELERATION (G)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: HEDRG2
FILTER: CH. CLASS 1000
PEAK DATA: 111.12 G @ 114.24 MS; 0.04 G @ -19.52 MS

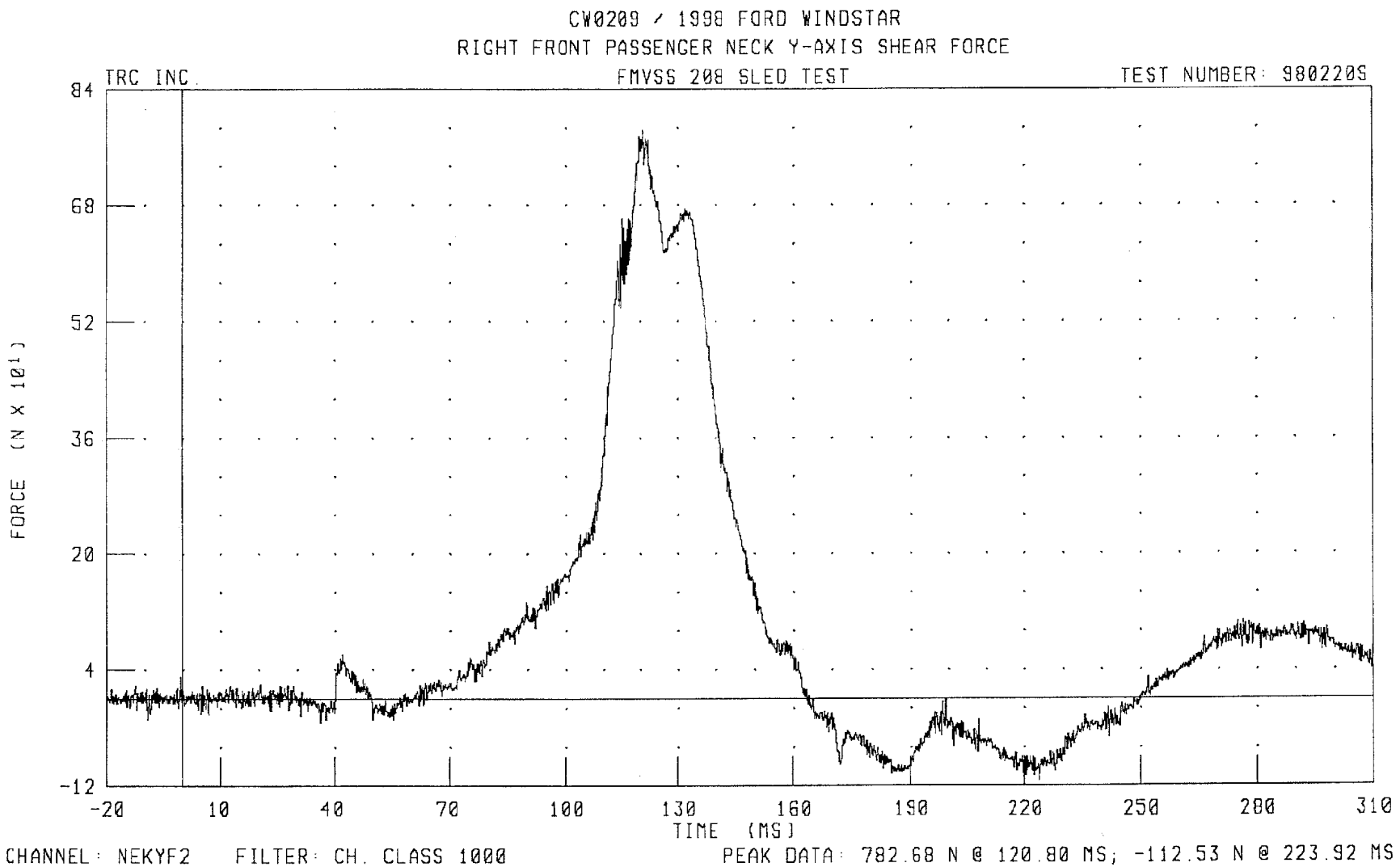
CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER NECK X-AXIS SHEAR FORCE

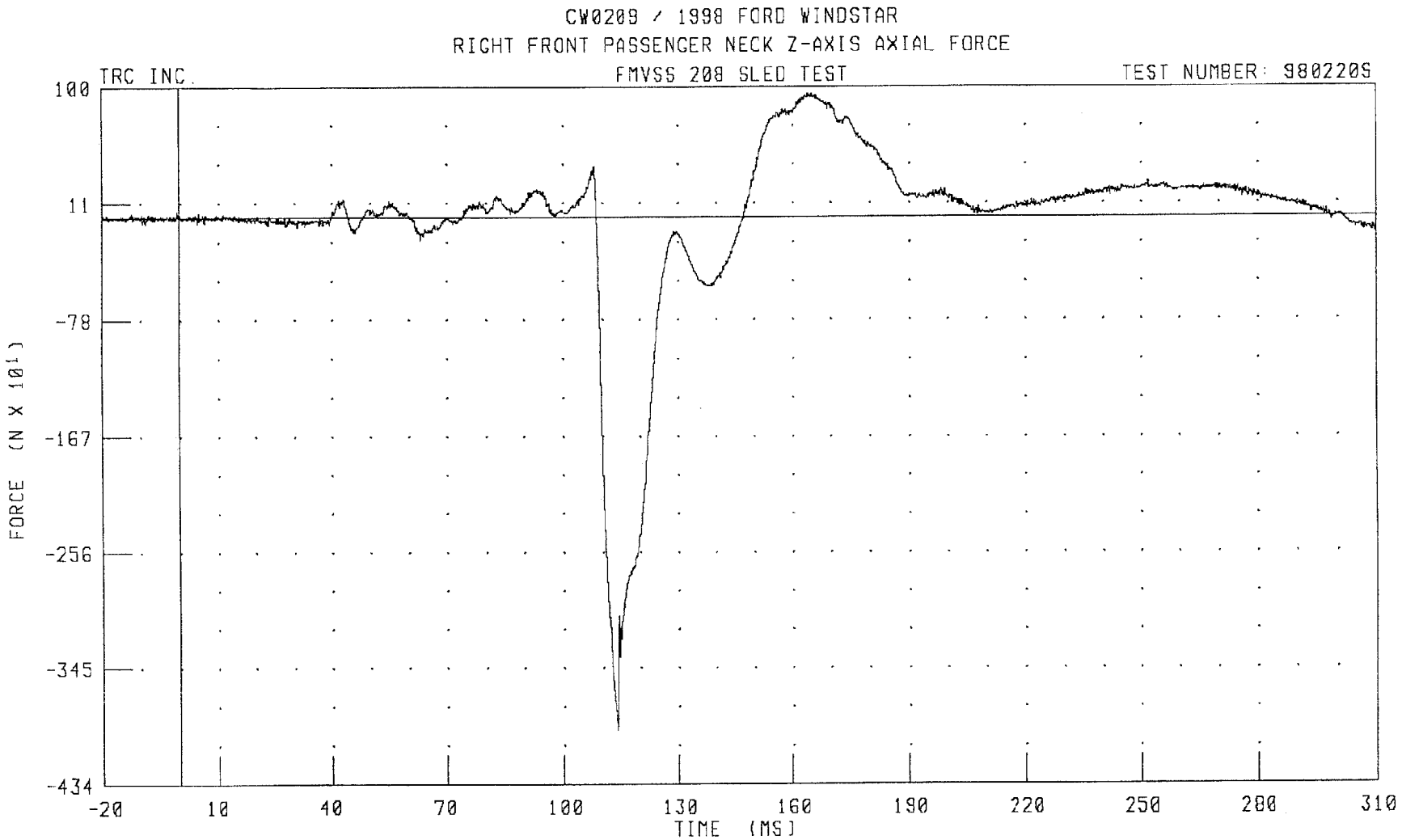



CHANNEL: NEKXF2 FILTER: CH. CLASS 1000 PEAK DATA: 1198.80 N @ 115.12 MS; -635.22 N @ 201.44 MS

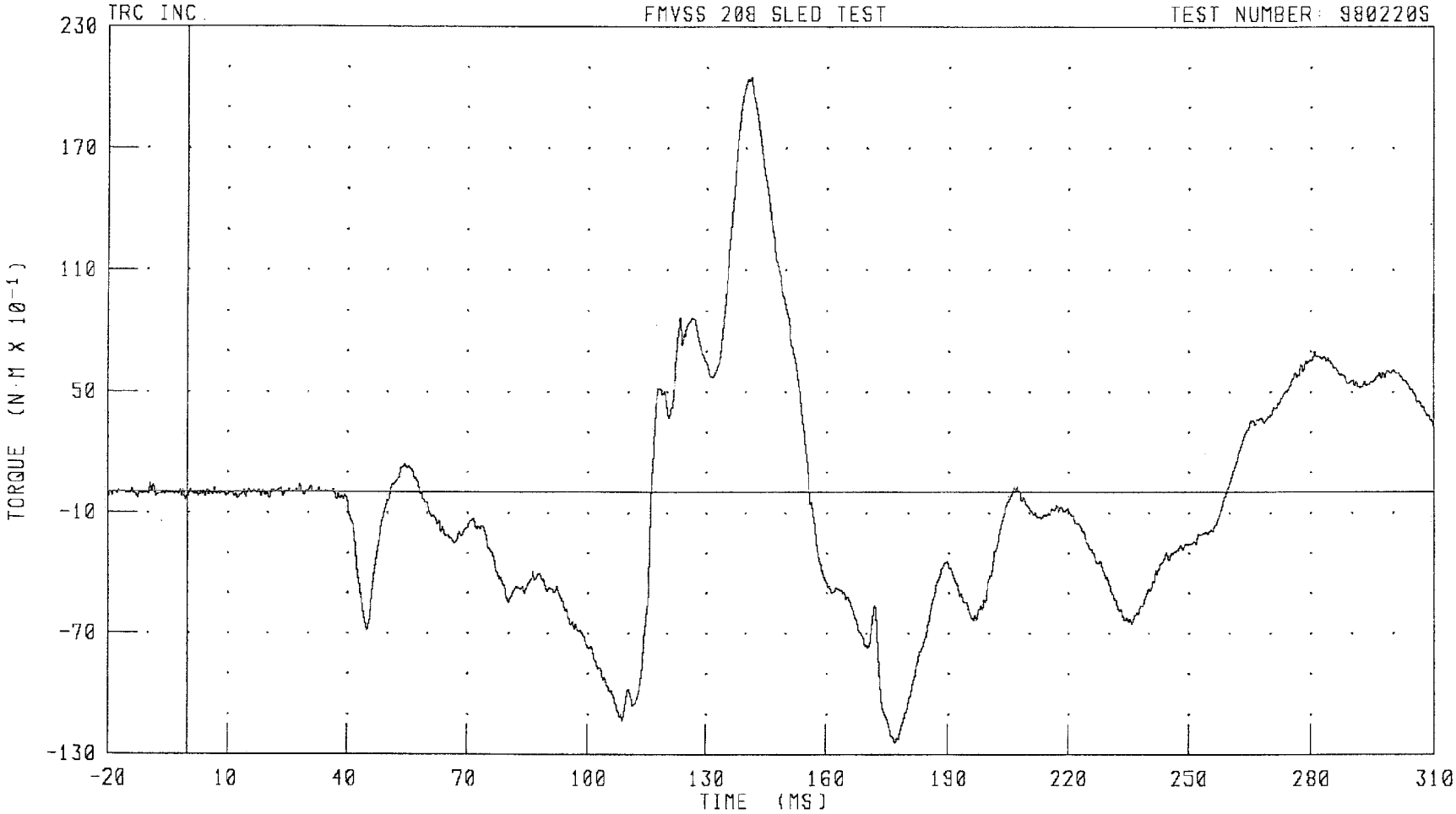


980220


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER NECK Y-AXIS SHEAR FORCE
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
84
68
52
36
20
4
-12
FORCE (N X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKYF2
FILTER: CH. CLASS 1000
PEAK DATA: 782.68 N @ 120.80 MS; -112.53 N @ 223.92 MS


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER NECK Z-AXIS AXIAL FORCE
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
100
11
-78
-167
-256
-345
-434
FORCE (N X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKZF2
FILTER: CH. CLASS 1000
PEAK DATA: 943.27 N @ 164.08 MS; -3929.22 N @ 114.00 MS

CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER NECK MOMENT ABOUT X AXIS




CHANNEL: NEKXM2 FILTER: CH. CLASS 600 PEAK DATA: 20.50 N-M @ 141.44 MS; -12.40 N-M @ 176.96 MS



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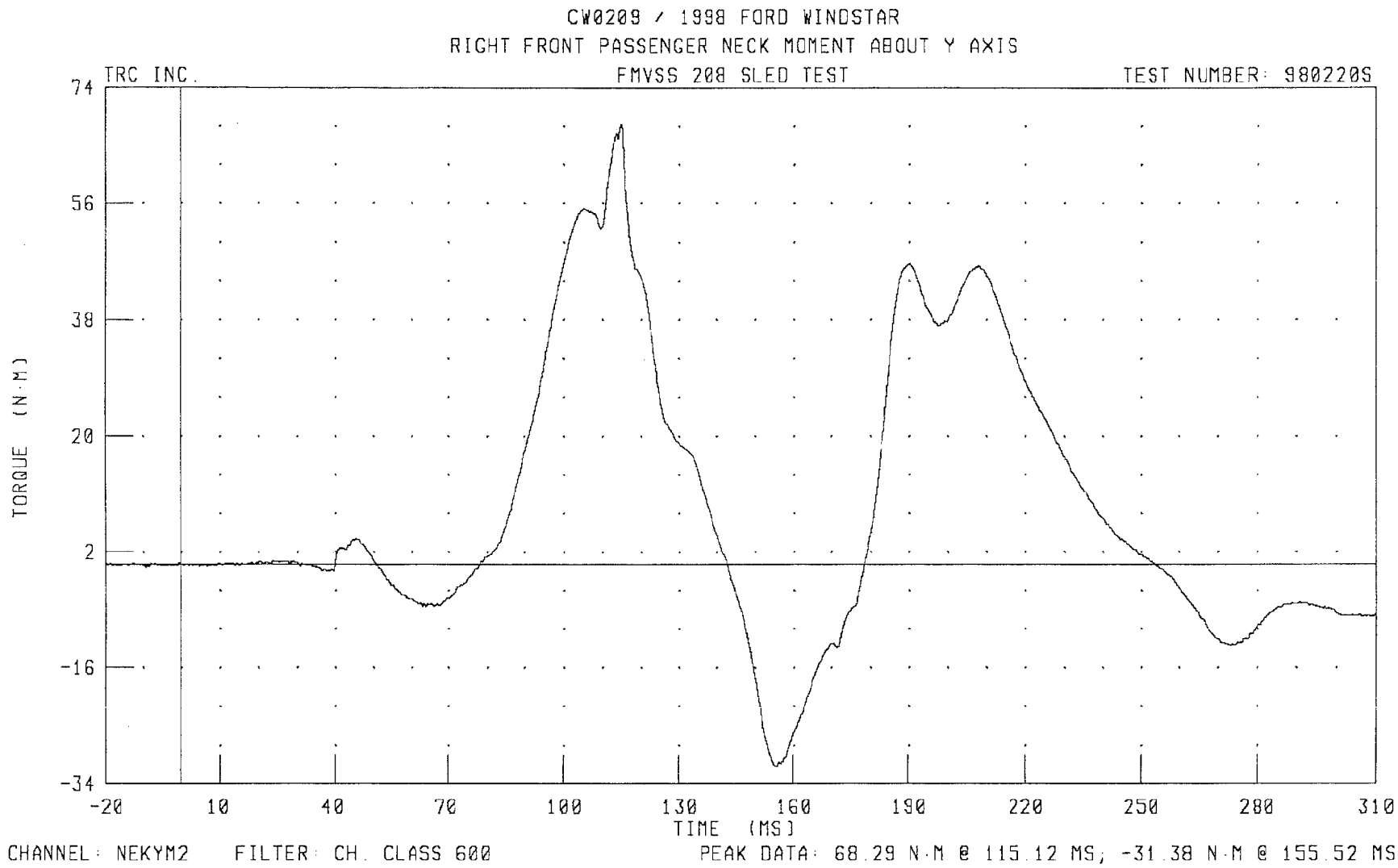
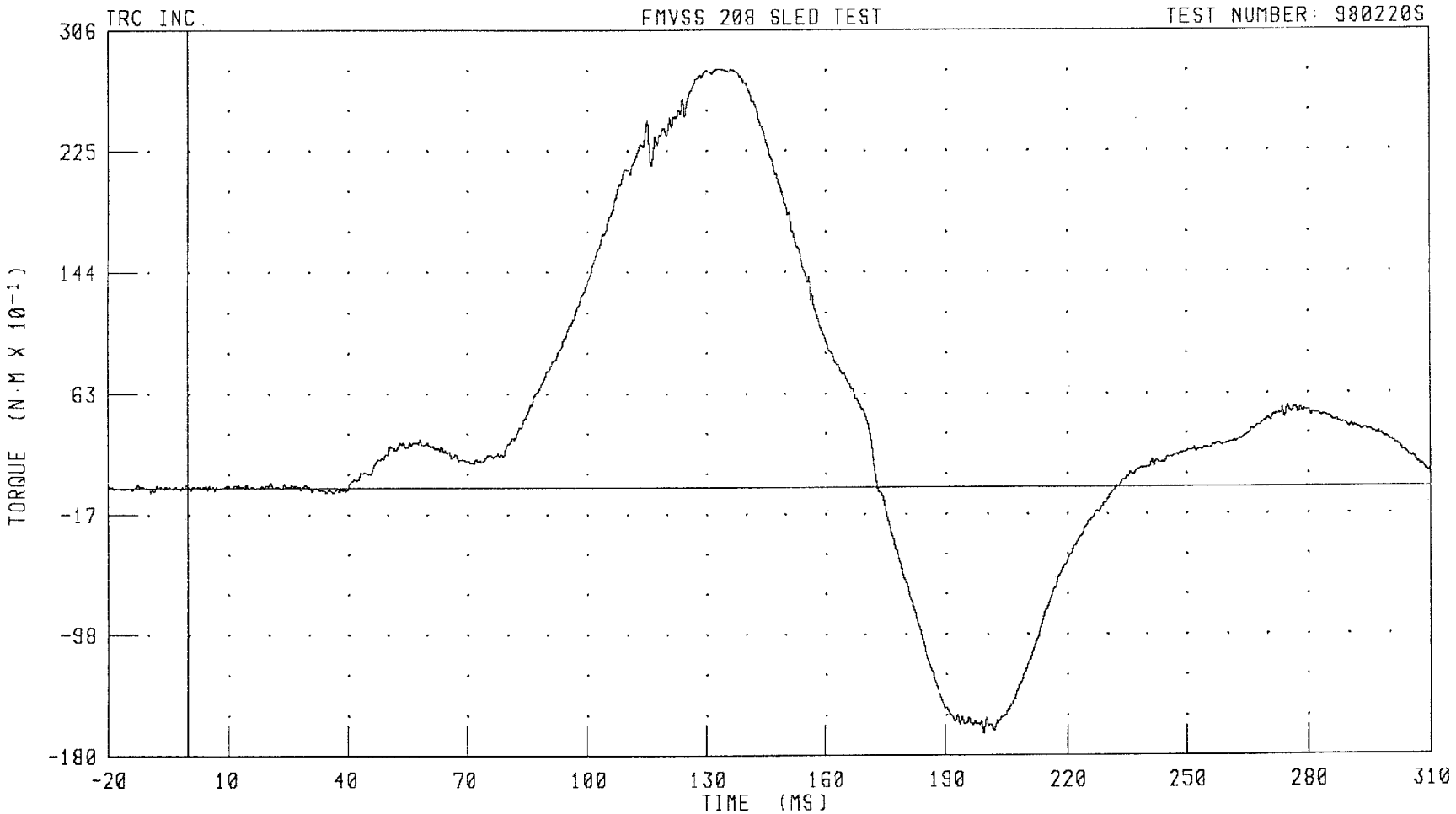

CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Y AXIS
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
74
56
38
20
2
-16
-34
TORQUE (N-M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKYM2
FILTER: CH. CLASS 600
PEAK DATA: 68.29 N-M @ 115.12 MS; -31.38 N-M @ 155.52 MS

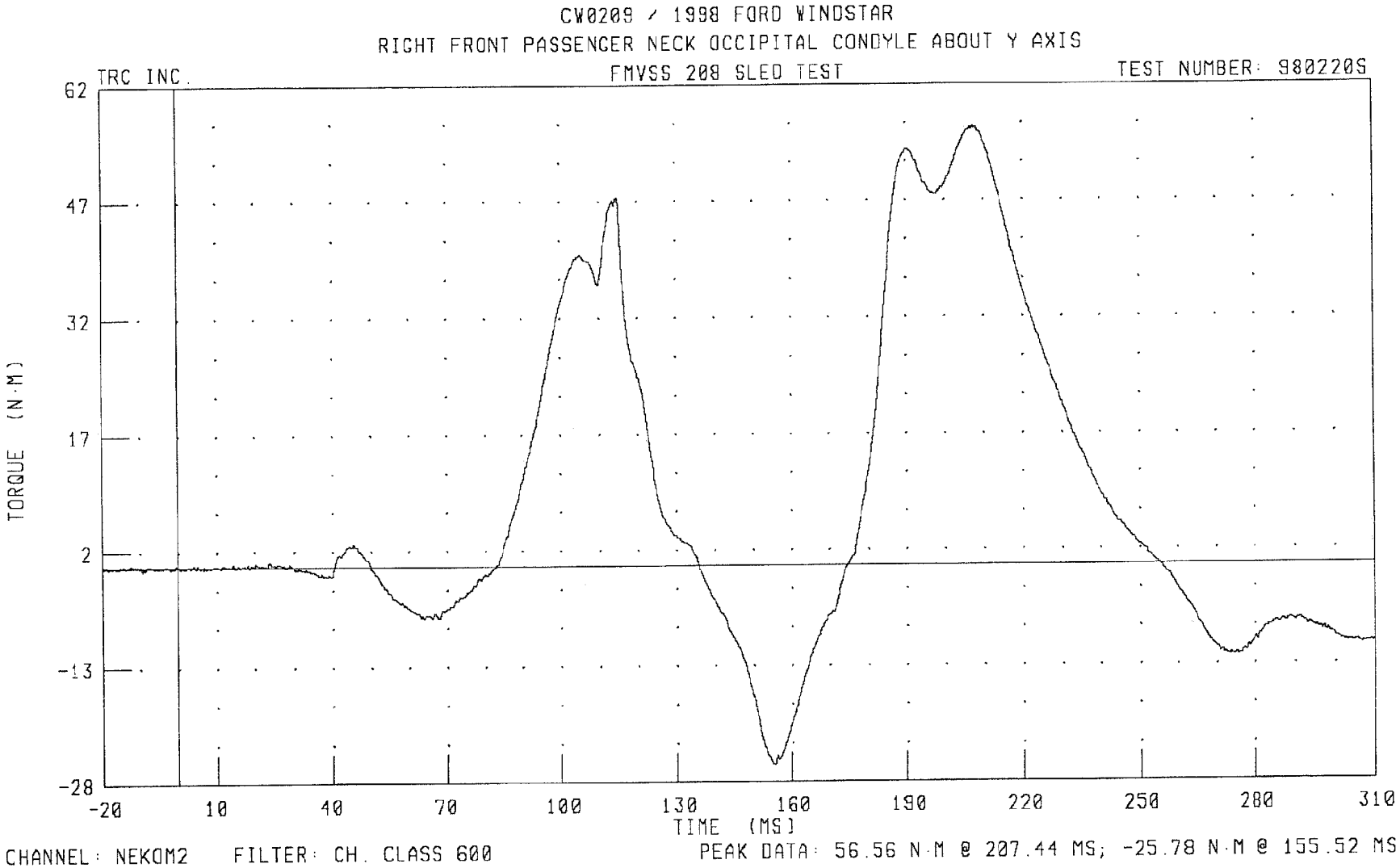
CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER NECK MOMENT ABOUT Z AXIS



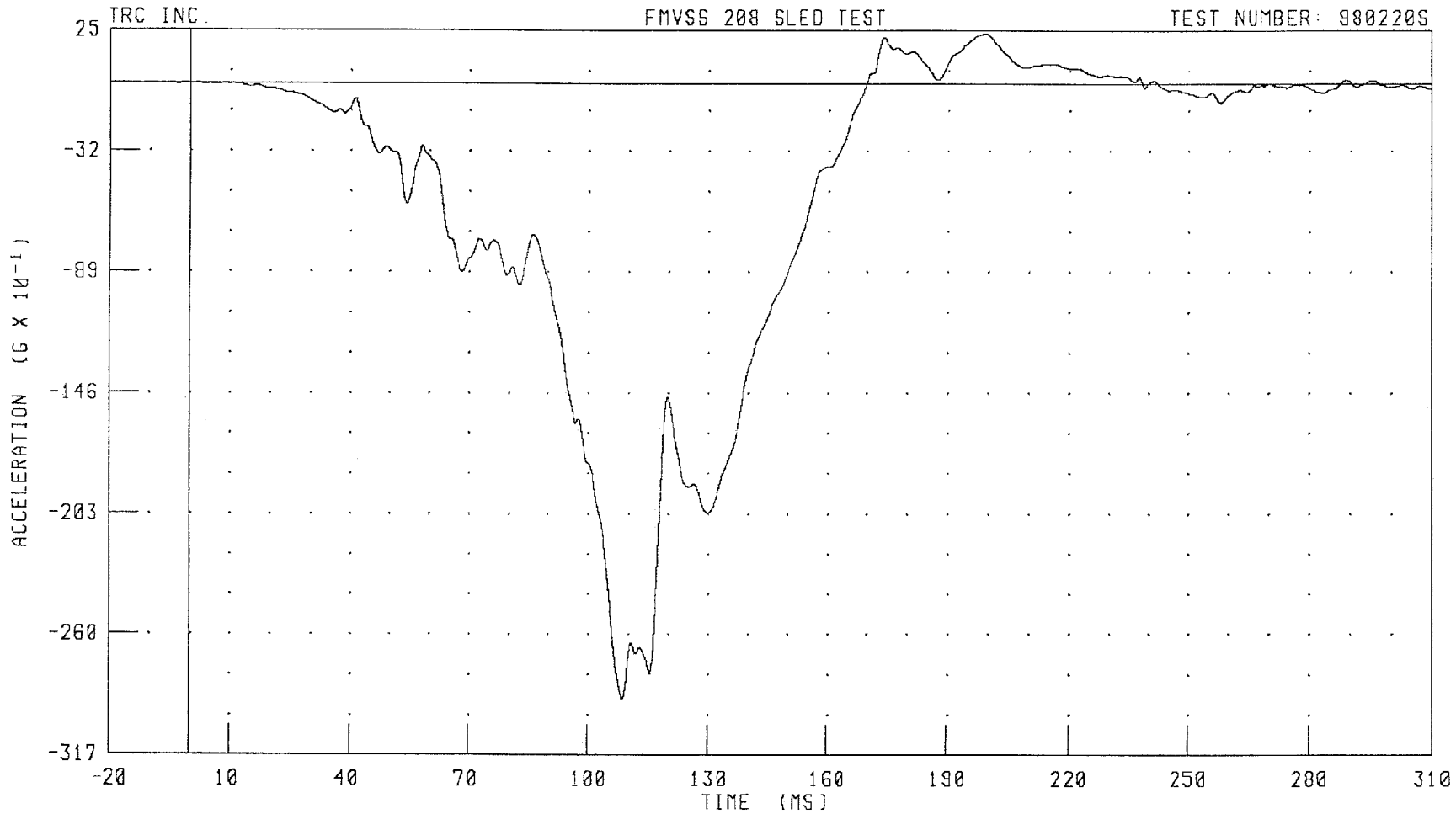

CHANNEL: NEKZM2 FILTER: CH. CLASS 600 PEAK DATA: 28.00 N·M @ 133.28 MS; -16.54 N·M @ 199.12 MS



980220


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER NECK OCCIPITAL CONDYLE ABOUT Y AXIS
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
62
47
32
17
2
-13
-28
TORQUE (N-M)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: NEKOM2
FILTER: CH. CLASS 600
PEAK DATA: 56.56 N-M @ 207.44 MS; -25.78 N-M @ 155.52 MS

CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER CHEST X-AXIS ACCELERATION




CHANNEL: CSTXG2 FILTER: CH. CLASS 180 PEAK DATA: 2.36 G @ 199.20 MS; -29.04 G @ 108.64 MS



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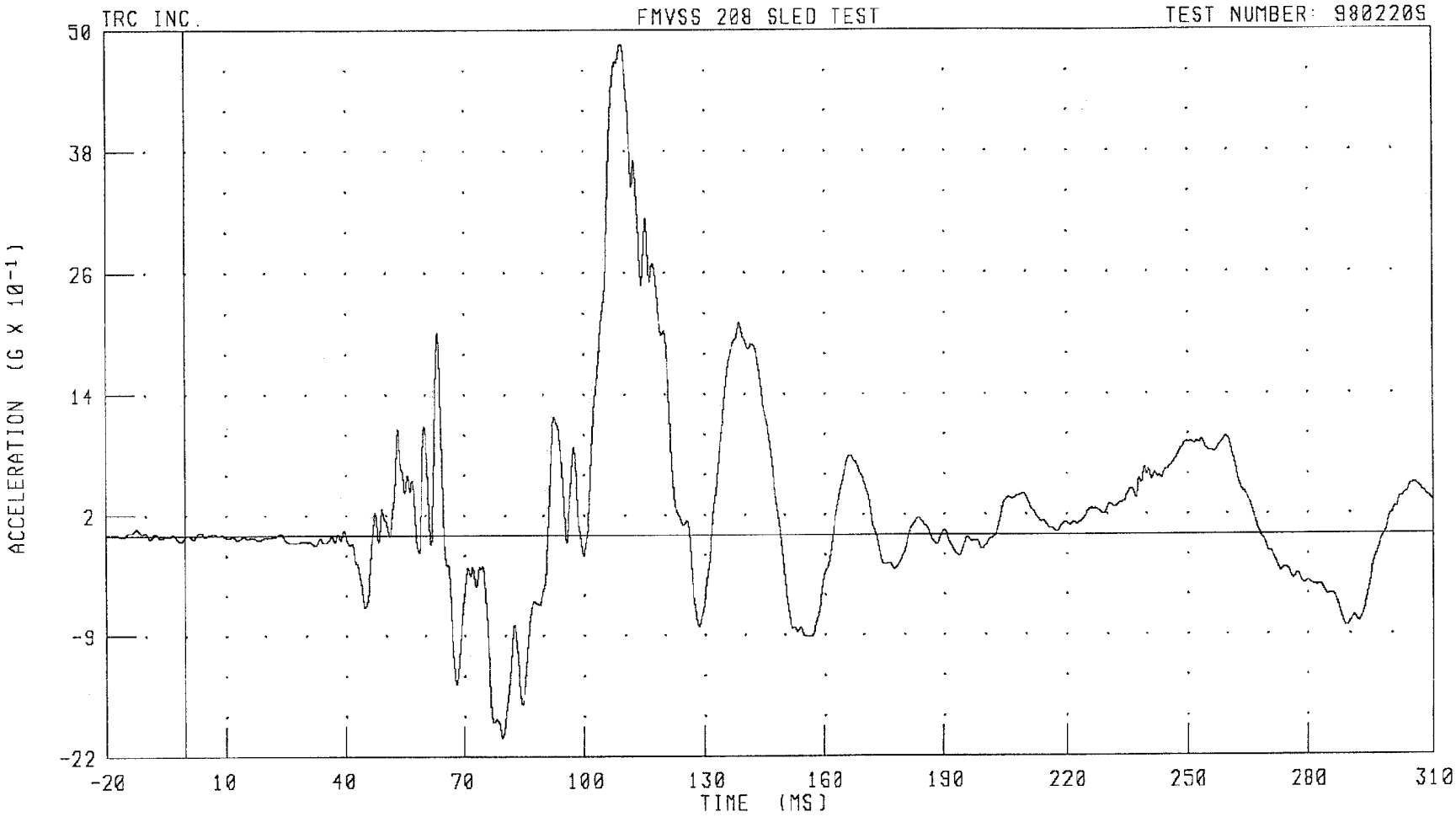
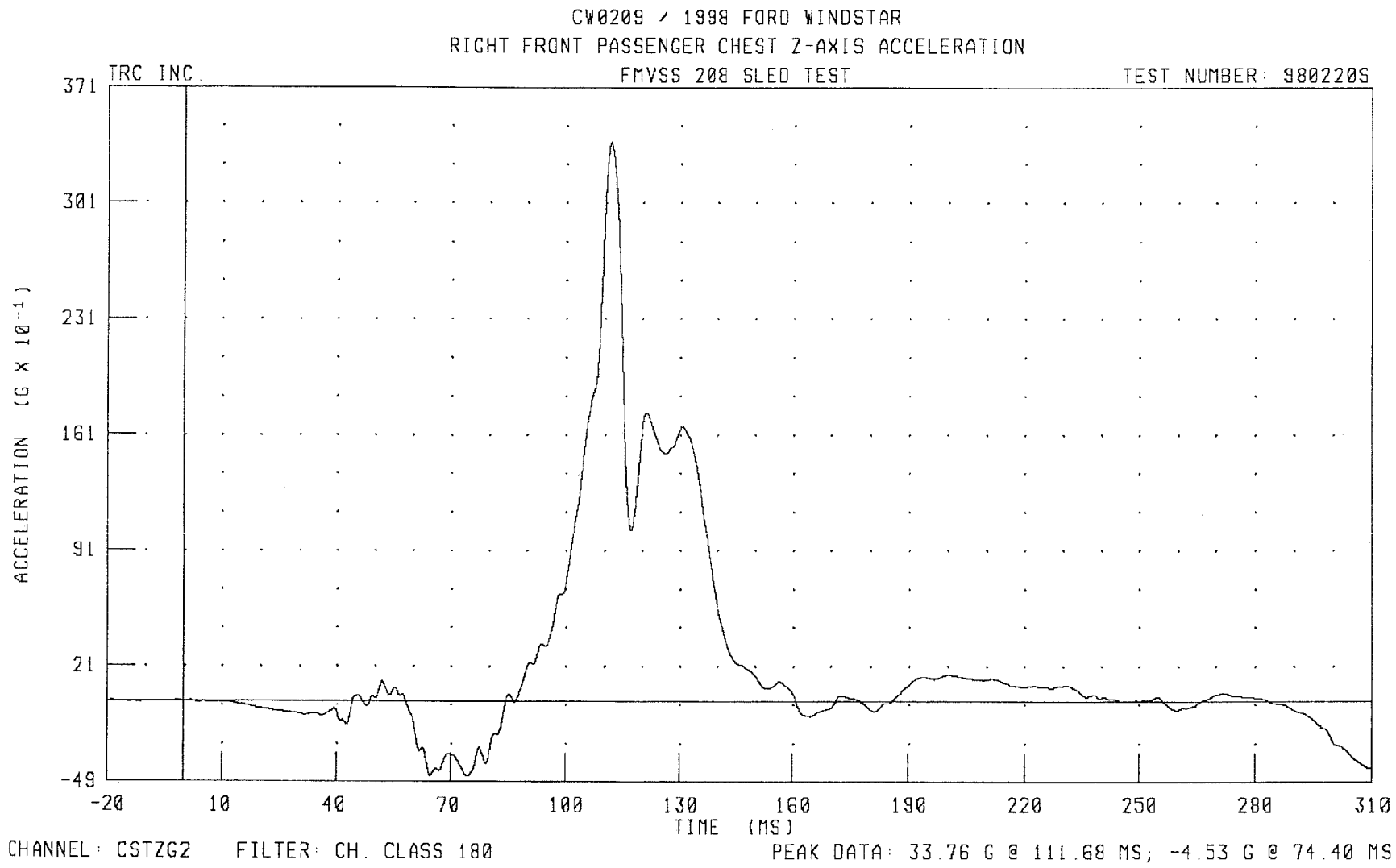
CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER CHEST Y-AXIS ACCELERATION

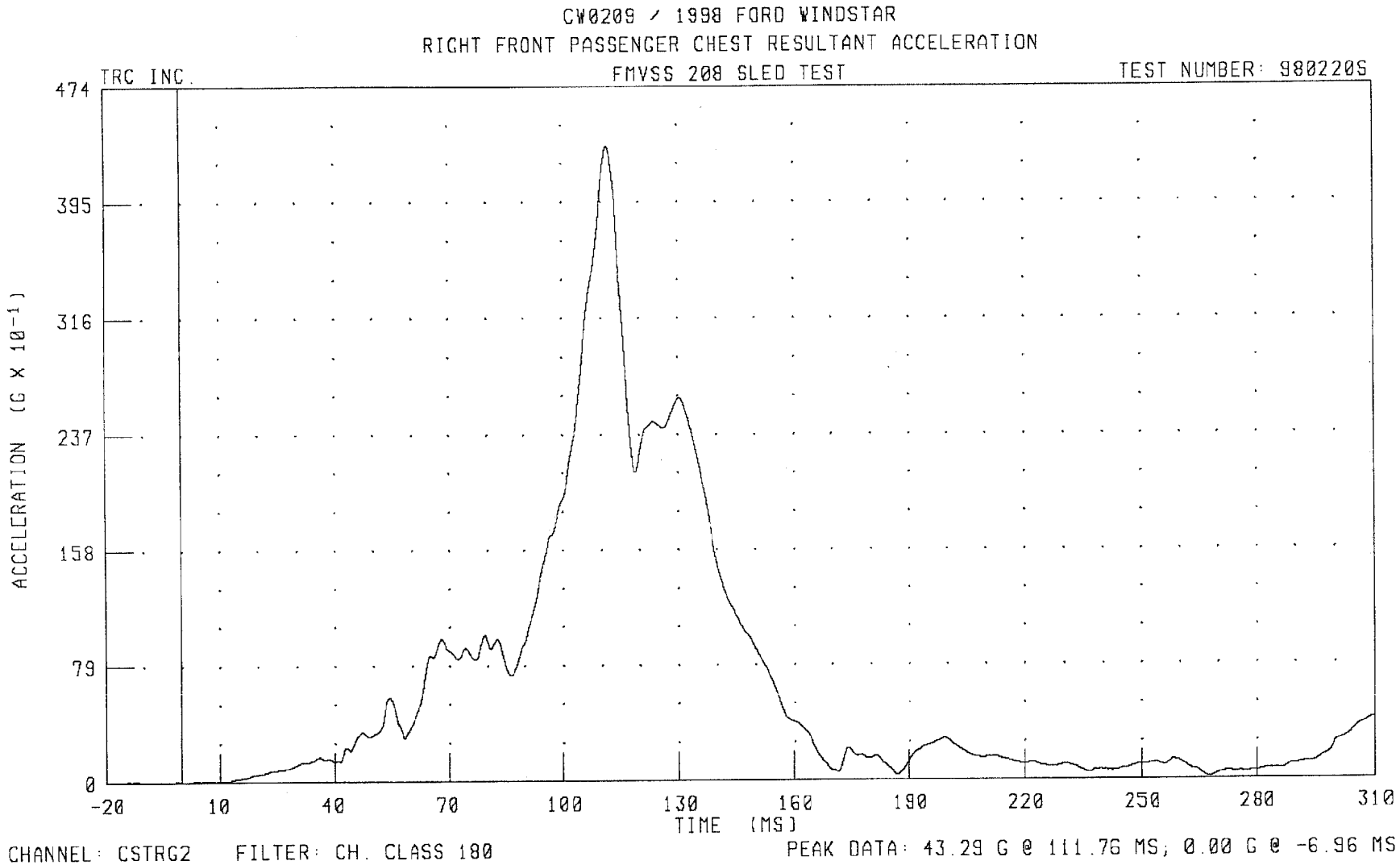


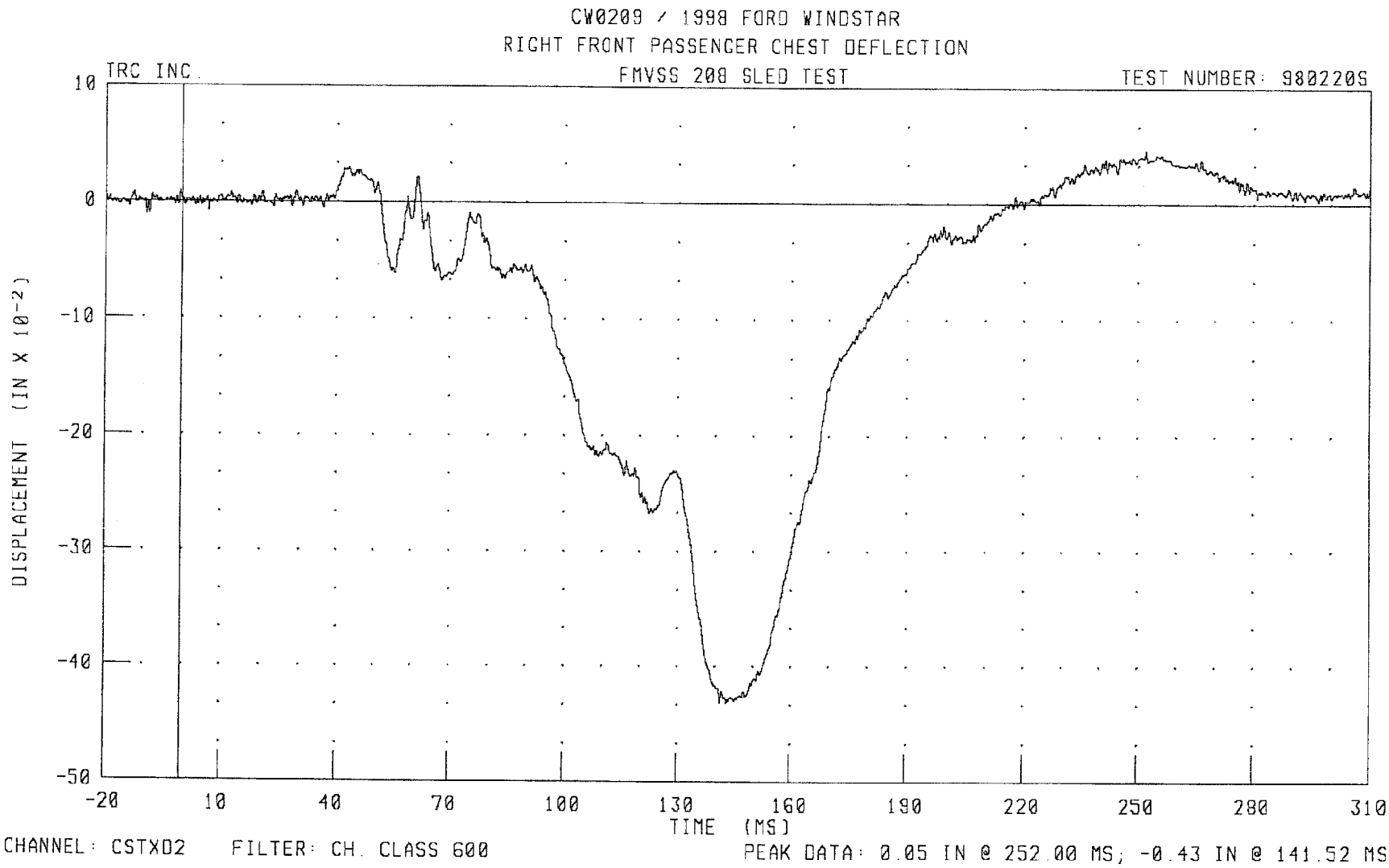

CHANNEL: CSTYG2 FILTER: CH. CLASS 180 PEAK DATA: 4.86 G @ 109.20 MS; -2.01 G @ 79.36 MS

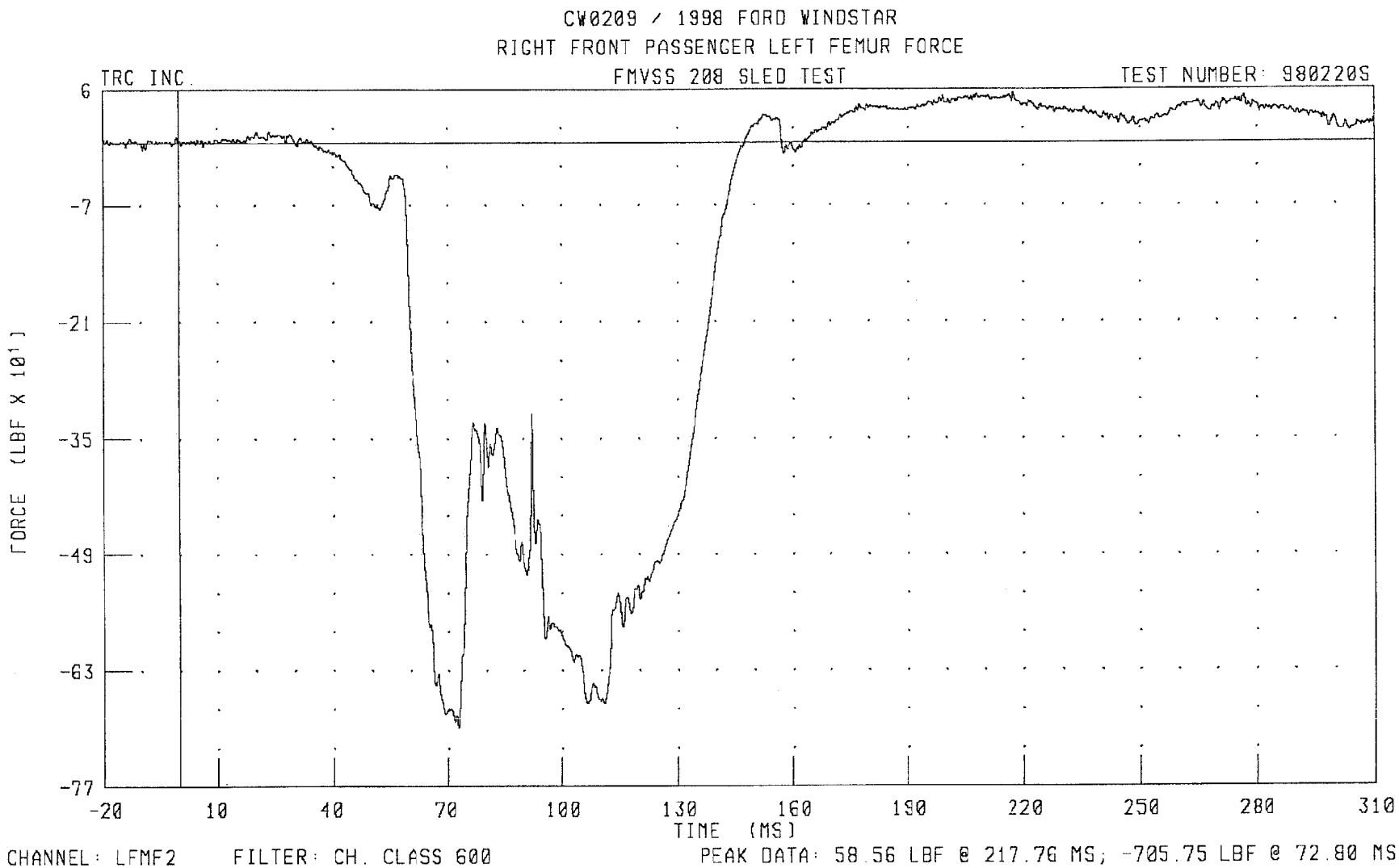


980220


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER CHEST Z-AXIS ACCELERATION
TRC INC
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
371
301
231
161
91
21
-49
ACCELERATION (G X 10⁻¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTZG2
FILTER: CH. CLASS 180
PEAK DATA: 33.76 G @ 111.68 MS; -4.53 G @ 74.40 MS

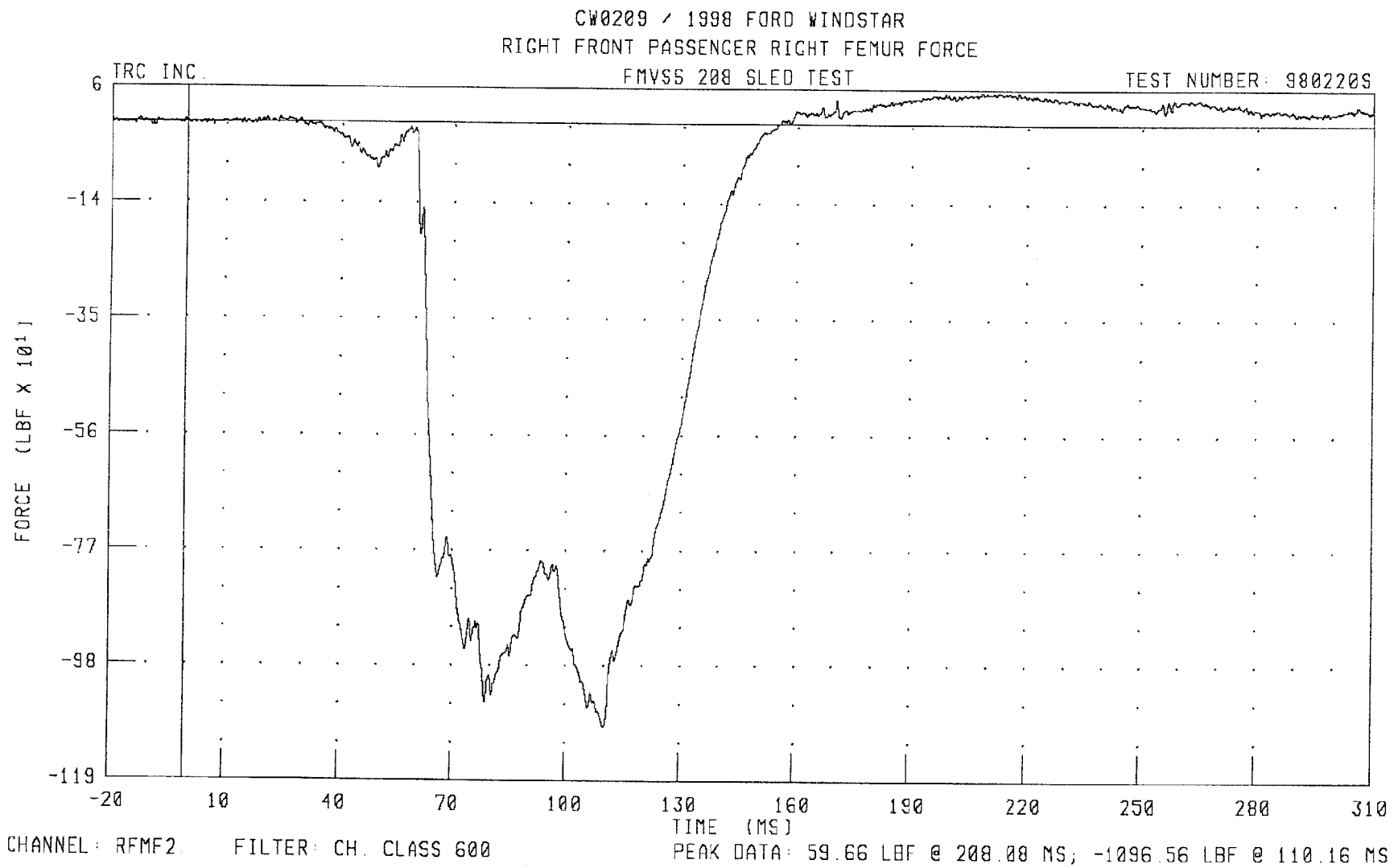

CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER CHEST RESULTANT ACCELERATION
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
474
395
316
237
158
79
0
ACCELERATION (G X 10-1)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTRG2
FILTER: CH. CLASS 180
PEAK DATA: 43.29 G @ 111.76 MS; 0.00 G @ -6.96 MS


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER CHEST DEFLECTION
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
DISPLACEMENT (IN X 10-2)
10
0
-10
-20
-30
-40
-50
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: CSTXD2
FILTER: CH. CLASS 600
PEAK DATA: 0.05 IN @ 252.00 MS; -0.43 IN @ 141.52 MS


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER LEFT FEMUR FORCE
TRC INC.
FMVSS 208 SLED TEST
TEST NUMBER: 980220S
6
-7
-21
-35
-49
-63
-77
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: LFMF2
FILTER: CH. CLASS 600
PEAK DATA: 58.56 LBF @ 217.76 MS; -705.75 LBF @ 72.80 MS



980220


CW0209 / 1998 FORD WINDSTAR
RIGHT FRONT PASSENGER RIGHT FEMUR FORCE
FMVSS 208 SLED TEST
TRC INC.
TEST NUMBER: 980220S
6
-14
-35
-56
-77
-98
-119
FORCE (LBF X 10¹)
-20
10
40
70
100
130
160
190
220
250
280
310
TIME (MS)
CHANNEL: RFMF2
FILTER: CH. CLASS 600
PEAK DATA: 59.66 LBF @ 208.00 MS; -1096.56 LBF @ 110.16 MS

# Appendix C

Manufacturer's Vehicle Information

L. W. Camp
Director
Automotive Safety Office
Environmental And Safety Engineering

Ford Motor Company
330 Town Center Drive
Dearborn, Michigan 48126

October 3, 1997



Mr. Harry Thompson
Chief, Vehicle Division
Office of Vehicle Safety Compliance
National Highway Traffic Safety
Administration
400 Seventh Street, S. W.
Washington, D.C. 20590

Dear Mr. Thompson:

Reference: NSA-31CCA/ OA:208970811P

This is in response to your letter of August 13, 1997, requesting information relative to possible FMVSS 208 testing by OVSC of the 1998 model year Ford Windstar equipped with driver and passenger air bag restraint systems.

By means of this submittal Ford is responding in full to your request nos. 2-5 and 7-13, and in part to your request nos. 1 and 6. We currently estimate that we will be providing the remaining information by November 20, 1997. For your convenience, each request is listed followed by Ford's response.

Request No. 1

"Please inform OVSC if the air bag restraint system is certified to meet the requirements of S4.1.5.1(a)(1) or S13.

If the air bags were installed to meet the requirements of S4.1.5.1(a)(1), please provide a copy of the certification test reports for the frontal/angular barrier impact tests of the automatic restraint system with the manual safety belts unfastened and fastened.

If the air bags were installed to meet the requirements of S13, please provide a copy of the certification test reports for the frontal/angular barrier impact tests of the automatic restraint system with the manual safety belts fastened and the certification test reports for the sled test with only the automatic restraint system."

Response

Ford is installing Second Generation air bags in all 1998 MY vehicles subject to the FMVSS 208 passive restraint requirements. The air bag restraint systems for all 1998 Ford Windstar vehicles manufactured on or after September 8, 1997 incorporated Second Generation air bags and meet the requirements of S13 of FMVSS 208.

Test reports demonstrating FMVSS 208 conformance for these Second Generation air bag equipped vehicles for the frontal barrier impact tests of the automatic restraint system with the manual safety belts fastened and test reports for the sled test with only the automatic restraint system will be finalized and provided to you by November 20, 1997. Angular requirements were addressed by means of engineering judgment based on the results of angular barrier tests of vehicles equipped with First Generation powered air bags with safety belts unfastened. A Test Report Data Summary of the frontal barrier and sled tests is provided as Attachment I.

Request No. 2

> "If the air bags are or will be depowered or changed from the previous model year, explain the changes."

Response

The Second Generation driver air bag system has revised air bag venting (reduced vent size). The passenger air bag system has a revised inflator for a more shallow rise rate, a smaller bag size, and an increased vent.

Request No. 3

> "If the air bag has been depowered or changed, explain how it can be determined, prior to purchase, that a particular vehicle has a depowered air bag."

Response

Attachment II contains a copy of the label affixed to the driver and front passenger side door windows indicating that the vehicle contains Second Generation air bags. Attachment 2 also contains a copy of that portion of the Ford Vehicle Identification Number (VIN) code information pertaining to restraint systems. For 1998 Windstars, the presence of a Second Generation air bag is indicated in position 4 of the VIN by an alternative code scheme which combines the brake system, the GVWR class and the type of restraint system. For instance, if the Windstar vehicle to be tested has hydraulic brakes and is in Class C, the position 4 VIN code will be "C" for vehicles equipped with First Generation air bags or "Y" for vehicles equipped with Second Generation air bags. Please note that a few early built vehicles have been equipped with the Second Generation air bags but may not contain this code. The presence of the label in the door windows should be relied on for establishing with certainty the presence of Second Generation air bags.

Request No. 4

> "If the vehicle was certified with unrestrained dummies to meet the requirements of S13, describe how to disconnect the air bags from the vehicle sensors and connect them to the triggering mechanism used in the sled test. Describe the method used in certification to determine when to trigger the air bag and the system used to trigger the air bag."

Response

The air bag was disconnected by locating the squib wires going into the air bag and unhooking the connector between the vehicle wiring harness and the air bag. The squib wires are then connected to an extension cable which supplies the firing current from the Programmable Time Fire Unit located in the Hyge sled control room. This system has an arming circuit and variable time delay (adjustable to 0.1 msec) which starts counting once time zero (T=0) has been triggered. At 20 msec after T=0, the Programmable Time Fire Unit sends current through the extension cable and into the air bag squib.

The Programmable Time Fire Unit has the capability of supplying between 12.0 and 12.5 volts with a momentary peak current draw of 20 amps. In testing conducted by Ford, the typical current draw is 3 to 6 amps. The time delay between T=0 and air bag deployment has been determined to be 20 msec. (An accelerometer is used on the sled to actually trigger T=0 when an acceleration of 0.5g is attained on the sled.)

Request No.5

> "State for any safety belt system in this vehicle whether or not it is equipped with a tension-relieving device. Provide a copy of the information furnished in accordance with S7.4.2, if the tension-relieving device is used."

Response

Tension-relieving devices are not used in 1998 Windstar safety belt systems.

Request No. 6

> "FMVSS No. 208, S8.1.5, allows the manufacturer the option of having movable vehicle windows and vents placed in the closed position. State whether the vehicle's movable windows and vents were opened or closed for the certification tests."

Response

The positions of moveable windows in the crash tests that were relied upon as a basis for certification to FMVSS 208 of 1998 Windstar vehicles will be provided with the test report summaries which will be forwarded to you by November 20, 1997. Ford prefers that the windows be in the closed (up) position for testing.

Request No. 7

> " Submit dummy placement measurements, including diagrams or photographs which show exactly where measurements were taken. Enclosed is a diagram of some of OVSC's dummy measurements. Where possible, use the dimension shown in the diagram to provide the individual dummy placement measurements.
>
> State whether the vehicle has a foot rest for the driver."

Response

Attachment III contains dummy placement measurements applicable to the 1998 Ford Windstar.

The 1998 Windstar has a foot rest for the driver .

Request No. 8

"Provide the seat positioning, steering column positioning, and fuel tank data on the enclosed form. If more than one front seating configuration, steering column, or fuel tank are available on this vehicle, provide separate information for each."

Response

Attachment IV contains the NHTSA form enclosed with your letter completed with the requested seat positioning, steering column positioning, and fuel tank data applicable to FMVSS No. 208 testing of the 1998 Windstar.

Request No. 9

"If the vehicle is equipped with adjustable seat [belt] anchorages, provide the manufacturer's nominal design position for a 50th percentile adult male occupant."

Response

The 1998 Windstar vehicles are equipped with adjustable seat belt anchorages. The nominal design position of the D-ring for the 50$^{th}$ percentile adult male occupant is in the mid position.

Request No. 10

" For barrier tests provide the speed at impact, vehicle test weight, and resulting injury criteria (i.e., HIC, chest acceleration, chest compression and femur loads) recorded for all certification tests conducted to meet the requirements of S4.1.5.1(a)(1). For sled tests, provide the resulting injury criteria (i.e., HIC, chest acceleration, chest compression, femur loads, and neck moments and forces) recorded for all certification tests conducted to meet the requirements of S13."

Response

This information is included in a Test Report Summary found in Attachment I.

Request No. 11

"When vehicle components must be removed to obtain the proper test weight for the barrier test, what components do you recommend for removal and in what priority order do you recommend removal?"

Response

The following is a suggested list of items which may be removed from the test vehicle for the barrier test. The list below is in order of removal priority:

- ◊ Second and third row seats
- ◊ Bumper
- ◊ Interior trim from B-pillar rearward
- ◊ Exhaust system from catalytic converter to tail pipe

All onboard instrumentation should be included in the vehicle test weight.

Request No. 12

> "If the vehicle uses a pressure vessel to inflate the air bag, provide a copy of the test reports or engineering analysis to demonstrate that it meets all the requirements of S9.1."

Response

The 1998 Windstar vehicles do not use pressure vessels to inflate the air bags.

Request No. 13

> "If the vehicle uses an explosive device to inflate the air bag, provide a copy of the test report or engineering analysis to demonstrate that it meets all the requirements of S9.2."

Response

Attachment V contains the engineering analyses and the related TRW test reports demonstrating compliance to S9.2 of FMVSS No. 208 for the 1998 Ford Windstar (UN93) driver and passenger air bag systems.

We believe the information and test reports contained herein are otherwise fully responsive to your request. If you have any questions, please call Mr. Roger Kolassa on (313) 337-6969.

Very truly yours,

L. W. Camp

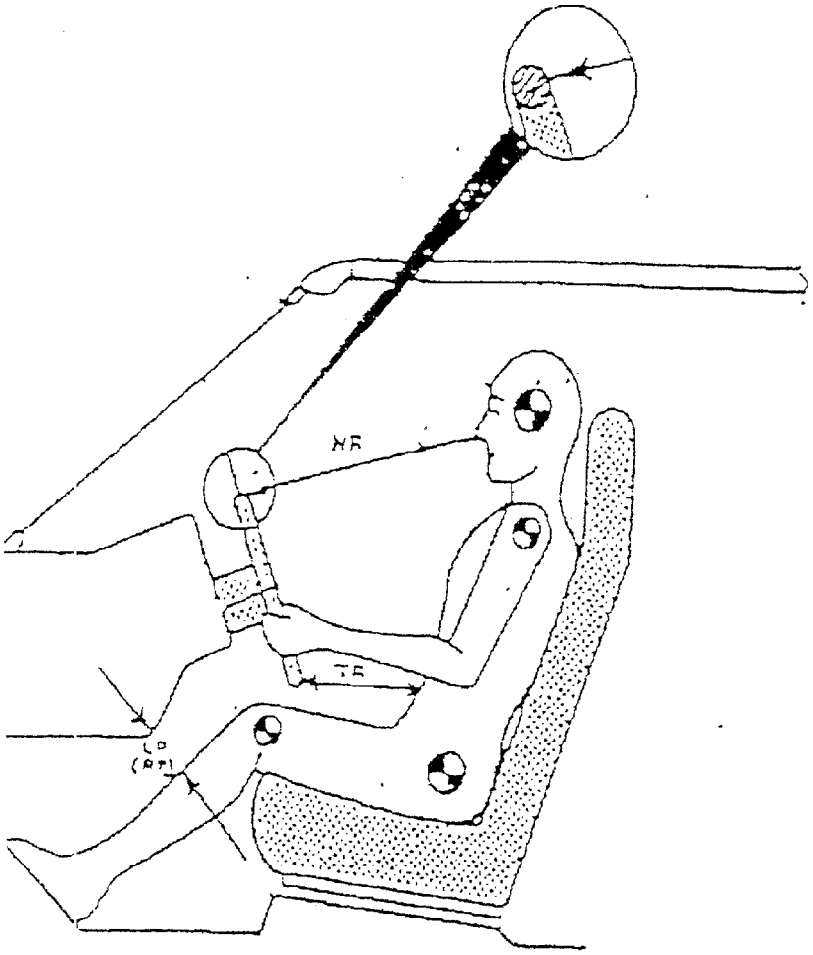
Attachments

# DUMMY MEASUREMENT SHEET

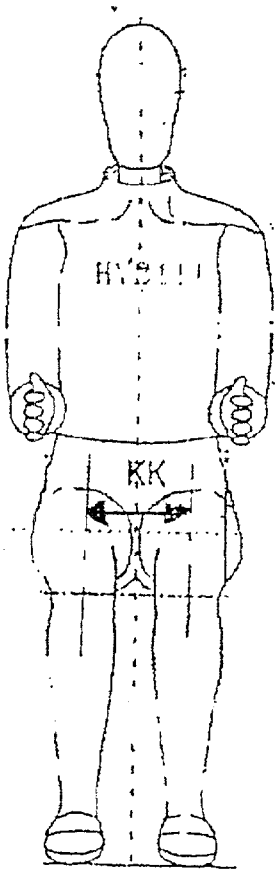
VEHICLE WINDSTAR

DRIVER DUMMY TO STEERING COLUMN/WHEEL ASSY.
REFERENCE DIMENSIONS.

IR#




LEFT SIDE VIEW




| | | MEASUREMENTS (All distances in inches) | |
|---|---|---|---|
| | | Target | Range * |
| NR | Distance from tip of dummy's nose to top rear surface of steering wheel rim. | 16.8 | 1.5 |
| TR | Horizontal distance from bottom rear surface of steering wheel rim to dummy's torso. | 8.3 | 0.6 |
| LP | Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface | 3.3 | 0.4 |
| RP | Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface | 3.4 | 0.5 |
| KK | Distance between centerline to centerline of dummy's legs. | 9.45 | 0.1 |

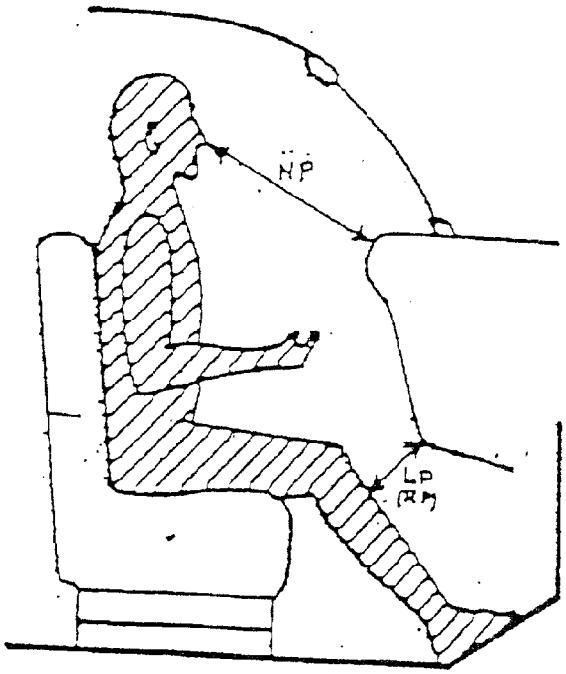
2 TEST RANGE

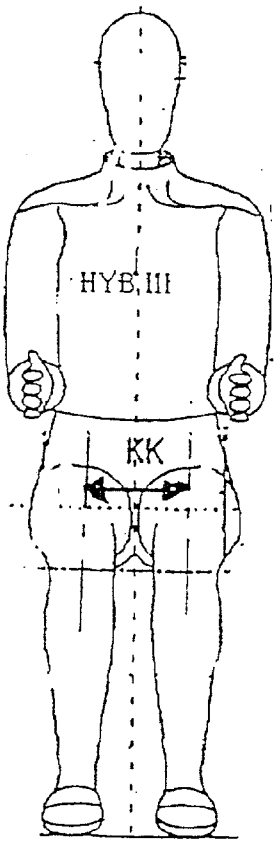
# DUMMY MEASUREMENT SHEET

VEHICLE WINDSTAR

PASSENGER DUMMY PLACEMENT REFERENCE DIMENSIONS.

IR#




RIGHT SIDE VIEW

| | | MEASUREMENTS (All distances in inches) | |
|---|---|---|---|
| | | Target | Range * |
| NP | Distance from tip of dummy's nose to closest point on surface of instrument panel. | 25.4 < | 0.3 |
| LP | Perpendicular distance from dummy's left lower leg surface to closest point on instrument panel surface | 3.9 | 0.5 |
| RP | Perpendicular distance from dummy's right lower leg surface to closest point on instrument panel surface | 4.3 | 0 3 |
| KK | Distance between centerline to centerline of dummy's legs. | 7.8 | 0.0 |

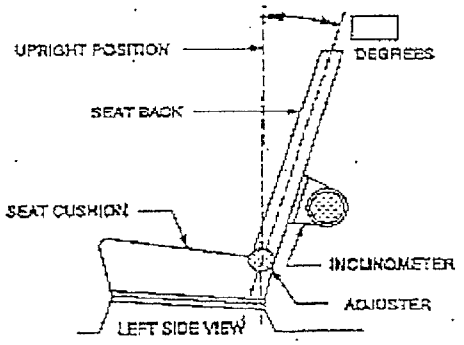
* 2 TEST Range

# TEST VEHICLE INFORMATION

Vehicle Model Year & Make: 1998 Ford Windstar
Vehicle Model & Body Style:

1. NOMINAL DESIGN RIDING POSITION --
For adjustable driver and passenger seat backs.

Please describe how to position the inclinometer to measure the seat back angle. Include description of the location of the adjustment latch detent if applicable.




Seat back angle for driver's seat = 21.5 degrees.
Measurement instructions:
Seat back angle is measured relative to the rocker sill. Remove back panel and position inclinometer as shown in drawing13 inches above back pivot point on rear outboard seat frame. Avoid taking measurement on reinforced plate.

Seat back angle for passenger's seat = 21.5 degrees.
Measurement instructions:
Same as driver.

2. SEAT FORE & AFT POSITIONS --
Provide instructions for positioning the driver and front outboard passenger seat(s) in the center of fore and aft travel. For example, provide information to locate the detent in which the seat track is to be locked.
Positioning of the driver's seat:
A reference mark is made on the seat. The seat is moved to the full rear position , and a mark is placed on the pedestal or carpet. The procedure is repeated for the full forward position. The distance from full forward to full rear is taken, half the distance is measured and marked on the pedestal. The seat reference is located at the mid position mark. The seat is in the full down position.

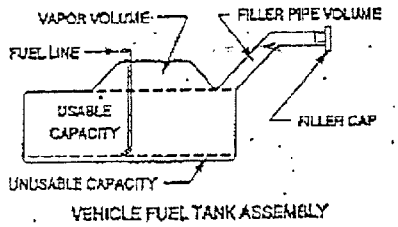
Positioning of the passenger's seat (if applicable):
Same as driver.

3. FUEL TANK CAPACITY DATA - -

3.1 A. "Usable Capacity" of standard equipment fuel tank = 20 gallons.

B. "Usable Capacity" of optional equipment fuel tank = 25 gallons.

C. Capacity used when certification testing to requirements of FMVSS 301 = 20/25 gallons.



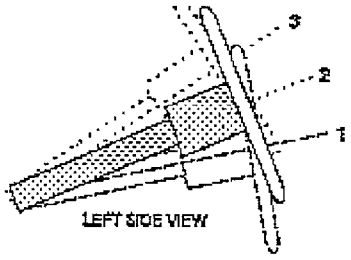

Operational Instructions:

3.2 Amount of Stoddard solvent added to vehicle for certification test = 19.0 / 23.75 gallons

3.3 Is vehicle equipped with electric fuel pump? X YES _____NO
If YES, explain the vehicle operating conditions under which the fuel pump will pump fuel.
The electric fuel pump operates for 2 seconds to pressurize the fuel system following the actuation of the ignition. If no attempt has been made to start the engine within 2 seconds following ignition actuation, the fuel pump will shut off. The fuel pump operates continuously while the engine is running. If the engine stalls, the fuel pump is inactivated. Also, a fuel pump shut-off switch is provided, designed to stop fuel flow to the engine if the vehicle sustains an impact above a certain magnitude.

4. STEERING COLUMN ADJUSTMENTS --

Steering wheel and column adjustments are made so that the steering wheel hub is at the geometric center of the locus it describes when it is moved through its full range of driving positions.
If the tested vehicle has any of these adjustments, does your company use any specific procedures to determine the geometric center.



STEERING COLUMN ASSEMBLY

Operational Instructions:

Adjust column to center detent which is 3rd notch of the 5 positions.

**ENVIRONMENTAL AND SAFETY ENGINEERING**
**AUTOMOTIVE SAFETY OFFICE**
**330 TOWN CENTER DRIVE**
**Suite 500 - FAIRLANE PLAZA SOUTH**
**DEARBORN, MICHIGAN 48126**

FAX Machine Telephone: USA (313) 594-2268 Automatic

Date: March 11, 1998
Time: 09:30AM

Please deliver to: Mr. Charlie Case
Office of Vehicle Safety Compliance
National Highway Traffic Safety Administration
400 Seventh Street, S.W.
Washington, DC 20590

Phone: (202) 366-5319
FAX: (202) 366-3081

cc: Ms. Virginia Watters and Mr. Mike Tonamen
Transportation Research Center (TRC)
10820 State Route 347
East Liberty, Ohio 43319-0367

Phone: (937) 666-2011
FAX: (937) 666-5705

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Number of sheets to be transmitted (Including this one): 2
Message/Special Instructions:

Subject: FMVSS 208 Sled Test: 1998 Ford Windstar: Clarification of Method Used for Setting The Front Seat Back Angle

Reference: Ford's FMVSS 208 Responses dated October 3, 1997 and November 13, 1997 (NHTSA Reference: NSA-31CCA/OA:208970811P)

Attached is a description of the method that was utilized for setting the front seat back angle on the 1998 Ford Windstar on which a FMVSS 208 Sled test was conducted at TRC on Friday February 20, 1998. Note that this method was different from the standard Ford practice (of using an inclinometer on the seat back 13 inches up from the pivot point) which was previously described and provided in our FMVSS 208 responses on the 1998 Ford Windstar.

If you should have any questions, please call me.

Paul A. Anton

**Paul A. Anton** Phone: (313) 594-0718
FAX: (313) 594-2268

FAXNHTS8.DOC

**To set front seat back angle to design position for 1998 Windstar:**

1. Release the latch by raising the recliner handle, positioning the seat in the forward dump position.

2. Remove the seat trim cover on the latch side.

3. Locate the 4 mm diameter hole in the lower sector of the recliner. It is located on the outside of the latch between the recliner mounting bolts, below the pivot.

4. Release the latch by raising the recliner handle and slowly recline the seat until the 4 mm hole in the outside latch plate is in alignment with the 4 mm hole in the internal latch sector. To facilitate aligning these two holes, a round probe tool can be inserted into the outer hole and pushed against the internal latch sector plate where it will insert further when it aligns with the second hole (see photo below). When these two holes are concentric, release recliner handle to lock the recliner in the design seat back position.

5. Install the seat trim cover.

Production Vehicle Safety
and Compliance
Automotive Safety Office
Ford Motor Company
March 10, 1998